VOLUME XLIX
NUMBER FOUR

# THE NATIONAL GEOGRAPHIC MAGAZINE

APRIL, 1926

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## ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

TO carry out the purposes for which it was founded thirty-eight years ago, the National Geographic Society publishes this Magazine. All receipts are invested in the Magazine itself or expended directly to promote geographic knowledge.

ARTICLES and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by an addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people.

THE Society is conducting extensive explorations and excavations in northwestern New Mexico, which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings and whose customs, ceremonies, and name have been engulfed in an oblivion.

THE Society also is maintaining expeditions in the unknown area adjacent to the San Juan River in southeastern Utah, and in Yunnan, Kweichow, and Kansu, China—all regions virgin to scientific study.

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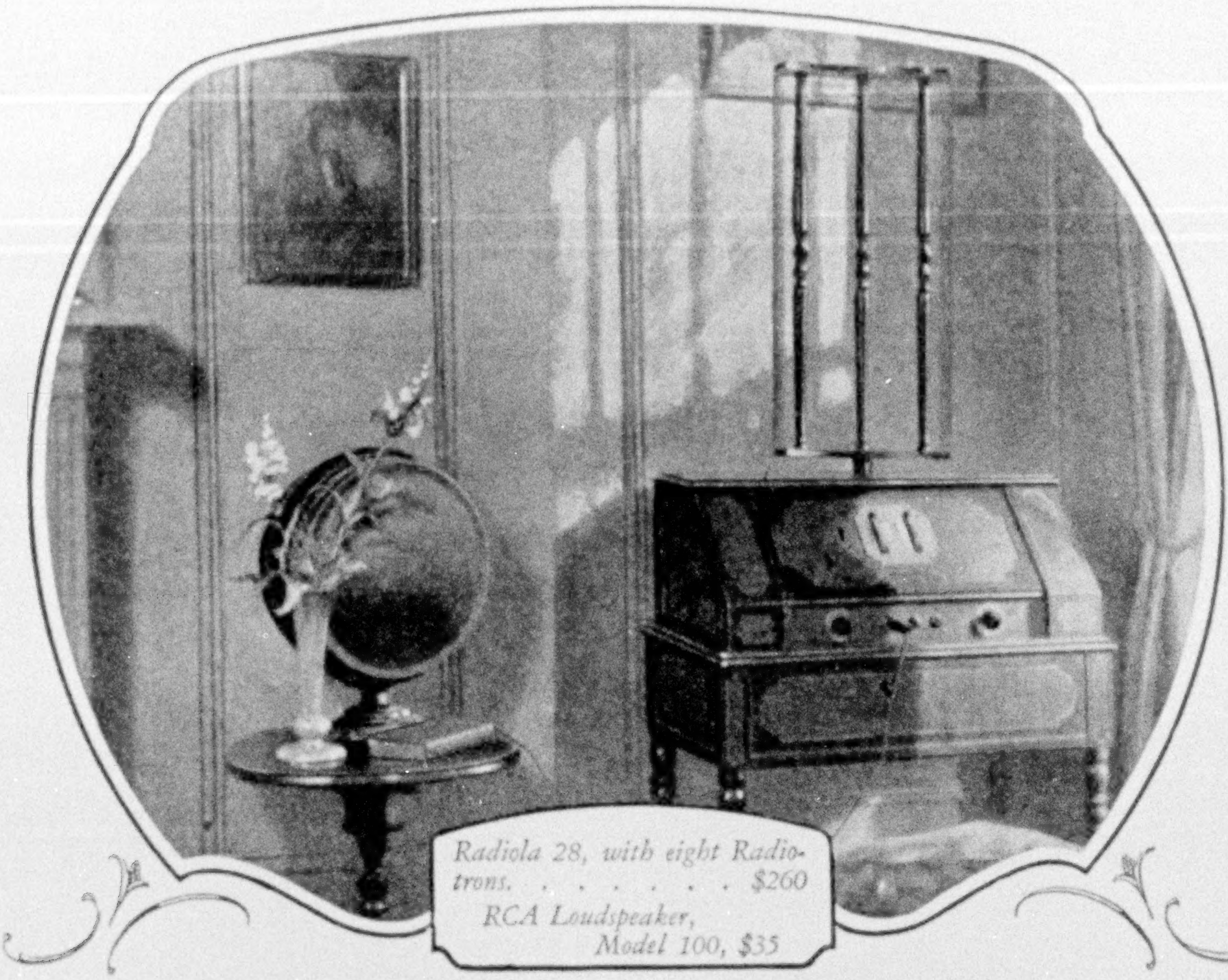
There is a finality about the new 90-degree Cadillac, and all it does, that is attracting new thousands to the supreme satisfaction of Cadillac ownership. In Cadillac they are finding motor car prestige, distinguished performance, transcendent luxury—everything that goes to endow a motor car with personality. They are now members of that numerous and ever-growing group who hold fast to the thought and the certainty that Cadillac is literally the standard of the world.

*Cadillac—Division of General Motors Corporation*



*Radiola 28, with eight Radiotrons. . . . . . . . $260*
*RCA Loudspeaker, Model 100, $35*

# Eight tubes —but a single control

Like an eight-cylinder car, the eight tube Super-Heterodyne gains ease of operation with power. The new Radiola 28 has five tuning circuits, each adding finer selectivity. It has eight tubes, each adding greater sensitivity. And the last tube, the new power Radiotron, adds volume —with clarity! But all the delicate mechanism is sealed away. And a single control tunes in the programs—station after station.

The man who owns a Radiola Super-Heterodyne today agrees with the scientist in the laboratory that the "Super-Het" is here to stay. Its performance and tone quality have been a two years' wonder.

With the Radiola 28 and the RCA Loudspeaker, a piano sounds like a piano— not like a banjo. A cello sounds like a cello—not like a violin. Each instrument keeps its tone and color. Every note is clear. The rough edges of distortion are smoothed away—and radio reception has become *reality!*

*Radiola 28 can be used with the new RCA power Loudspeaker Model 104. With this (plus the "A. C. package") you just plug in on the house current (50 or 60 cycle, 110 volt, A. C.) with no batteries—and get a whisper clearly—or a symphony concert at the actual volume of the original!*

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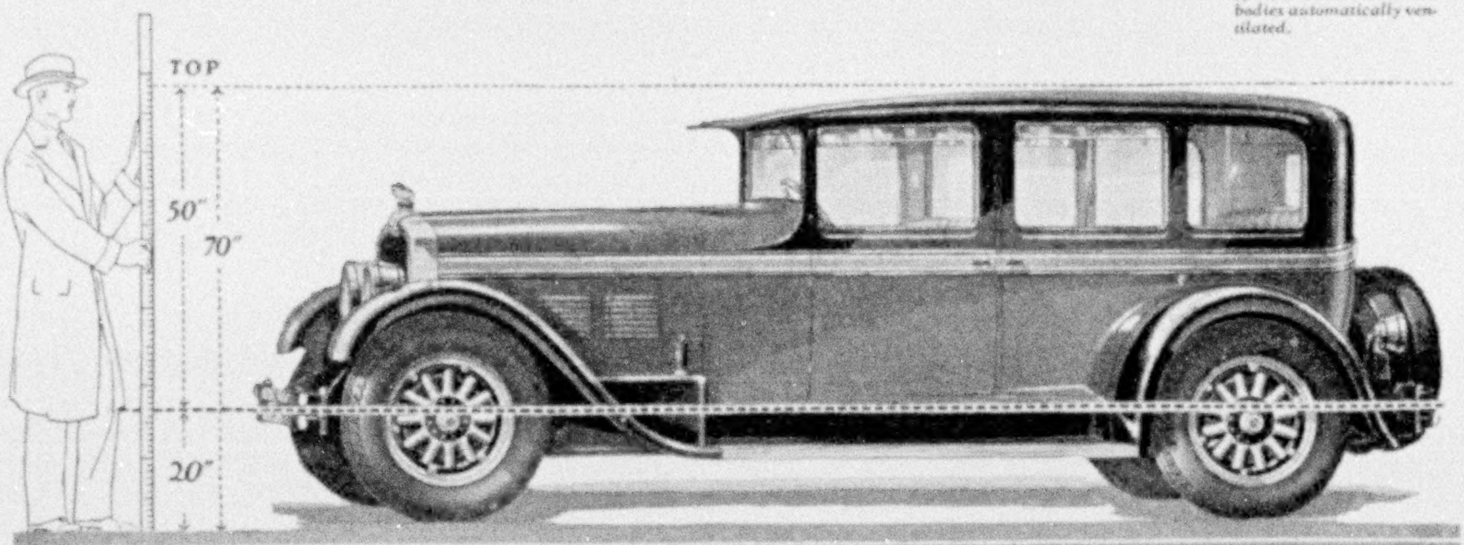
# Safety, comfort, performance assured as never before –

# The NEW STUTZ

STUTZ
SAFETY 8 CHASSIS

Six body styles, designed and constructed under the supervision of Brewster of New York. All closed bodies automatically ventilated.



## SAFETY CHASSIS

## The engineering achievement of the decade

Body five inches nearer the ground
*—yet providing full road clearance and headroom*

Radically lowered center of gravity
*—giving greater safety, comfort and roadability*

Quiet, long-lived, worm-drive rear axle
*—permitting lowered body; it improves with use*

90 H.P. motor; with overhead camshaft
*—novel design; smooth, flexible, vibrationless*

New, non-leaking hydrostatic brakes
*—inherently equalized; quick-acting and positive*

EACH year brings new names, new models, new refinements in the design of the conventional automobile.

But only after long intervals, does there appear a radical advance in automotive engineering. Such intervals have been punctuated by the advent of the pneumatic tire, electric starting and lighting, balloon tires, and later, 4-wheel brakes.

And now with the year 1926, comes a new motor car epoch upon the appearance of The NEW STUTZ. This new car is destined to influence all future engineering practice.

This is not merely the opinion of the makers of The NEW STUTZ.

The conviction has been expressed, even more emphatically by outside, and even competitive, engineers who have examined The NEW STUTZ—who have ridden in it and driven it.

First of all, The NEW STUTZ gives the motorist a new degree of safety — increased protection for the car's passengers and for the car itself. This safety factor is attained chiefly by a radical lowering of the center of gravity—the floor of The NEW STUTZ is five or more inches lower than conventional chassis design permits.

Greater — far greater — stability and road-adhesiveness are thus secured. There can be no two opinions on this point. And this is accomplished while maintaining more than ample headroom and full road clearance.

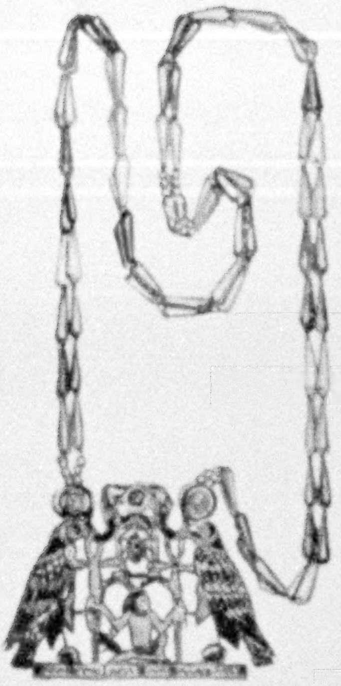
Many other unusual features contribute to the super-safety of The NEW STUTZ. To mention only a few: the frame is the most rigid on any car; the car is more easily controlled; the new principle of braking is of greater efficiency; the acceleration is more rapid; the running boards are of pressed steel — actually side-bumpers; the front corner-posts are narrow, giving unobstructed vision; the wind-shield is of safety-glass.

The NEW STUTZ is vibrationless at all speeds—an almost incredible statement, yet already confirmed through tests conducted by many leading American and European automotive engineers. There is no noise of valve operation and no noise at the rear axle or elsewhere. It is a car so surpassingly quiet that it seems moved by magic.

The chassis of The NEW STUTZ is automatically self-lubricated. There is a triple-duty oil rectifier and an air-cleaner of proven efficiency; dual ignition; and, of course, innumerable conveniences and refinements in keeping with its basically advanced design.

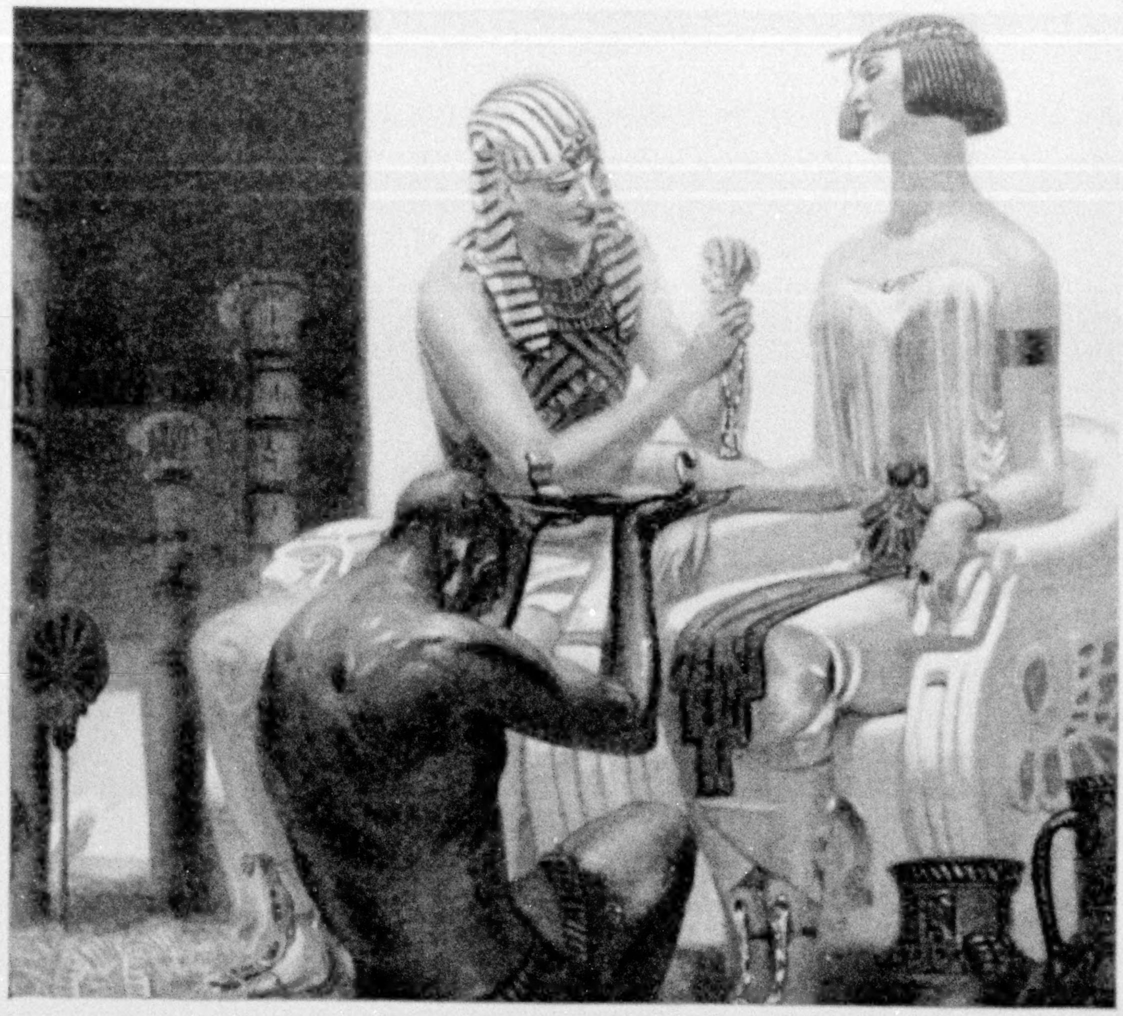
Words alone, or even pictures, cannot convey an adequate conception of the new and different engineering principles embodied in The NEW STUTZ. You must actually *see* the car and drive it yourself.

STUTZ MOTOR CAR CO.
OF AMERICA, Inc.
Indianapolis



*The Pectoral and Necklace of Princess Sat-hathor-iunut*

Made of gold, carnelian, lapis lazuli and green felspar, and dating back to the dynasty of King Senusert, who reigned in Egypt from 1806 to 1887 B. C. Discovered by Prof. W. M. Flinders Petrie in 1914, and now the property of the Metropolitan Museum of Art, New York City



# He did his gift shopping at the jewelers!

## A PURCHASE FROM YOUR JEWELER IS AN INVESTMENT IN PERMANENT VALUES

* * *

MEN and nations pass. But their jewels remain. Of all the possessions of ancient civilizations, the most enduring have been the tokens wrought in precious stone and metal.

Gone are the palaces of Egyptian kings, their gorgeous apparel and equipages. But scattered among the museums of today, in all parts of the world, many of their jewels are still intact, more beautiful and infinitely more valuable than ever.

Today, as always, a purchase at the jeweler's is an investment in permanent values. Jewelry is one of the few luxury-commodities which can be "consumed" year by year, decade after decade, without materially lessening the quantity or quality of the basic value!

Building up a line of jewelry means building up an asset-heritage for future generations, while enjoying the delight and charm of beautiful adornment in the building.

The jewelry business is among the fastest-growing in America, because, more and more, keen Americans are putting their shopping money into imperishable values.

ELGIN

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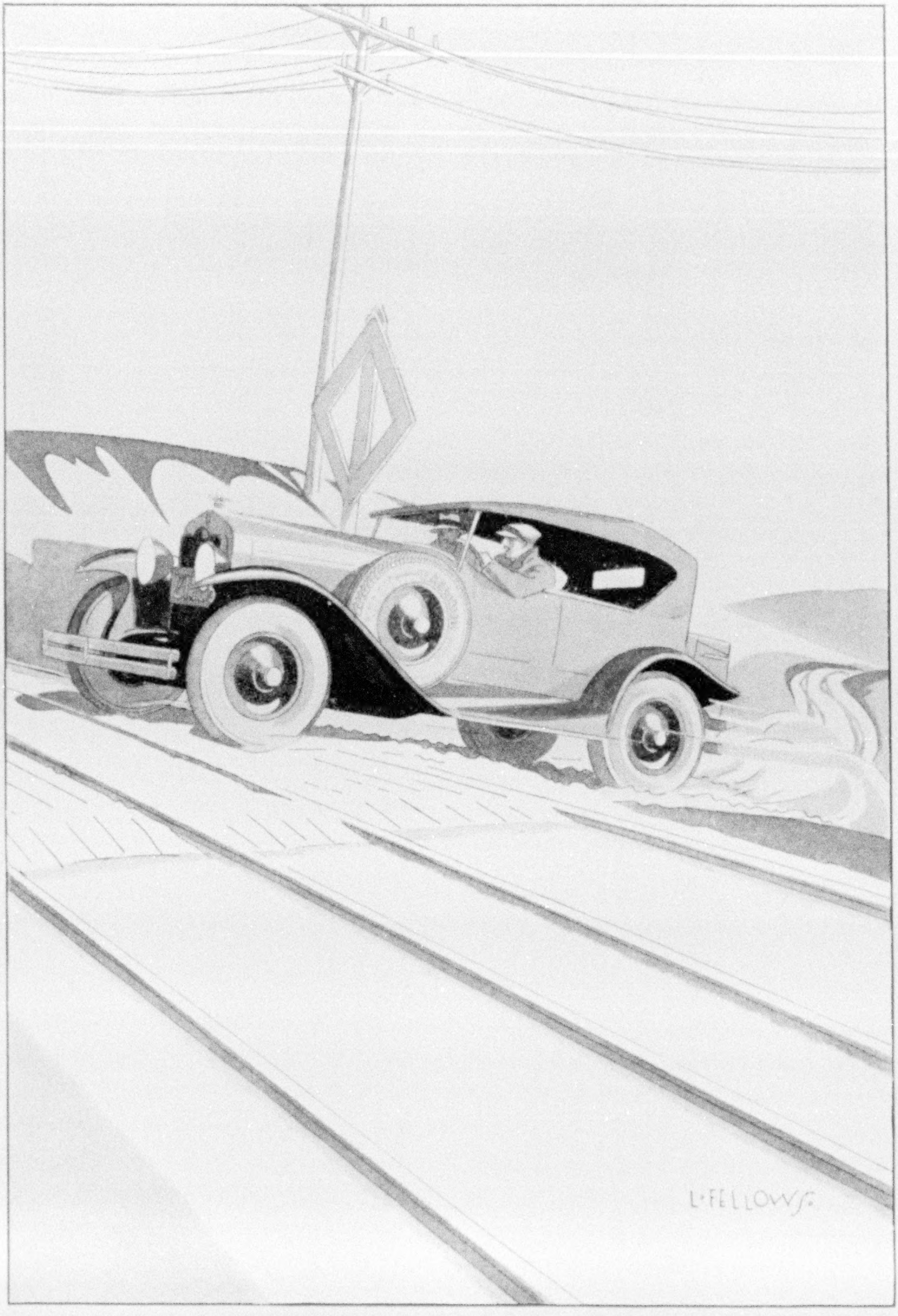
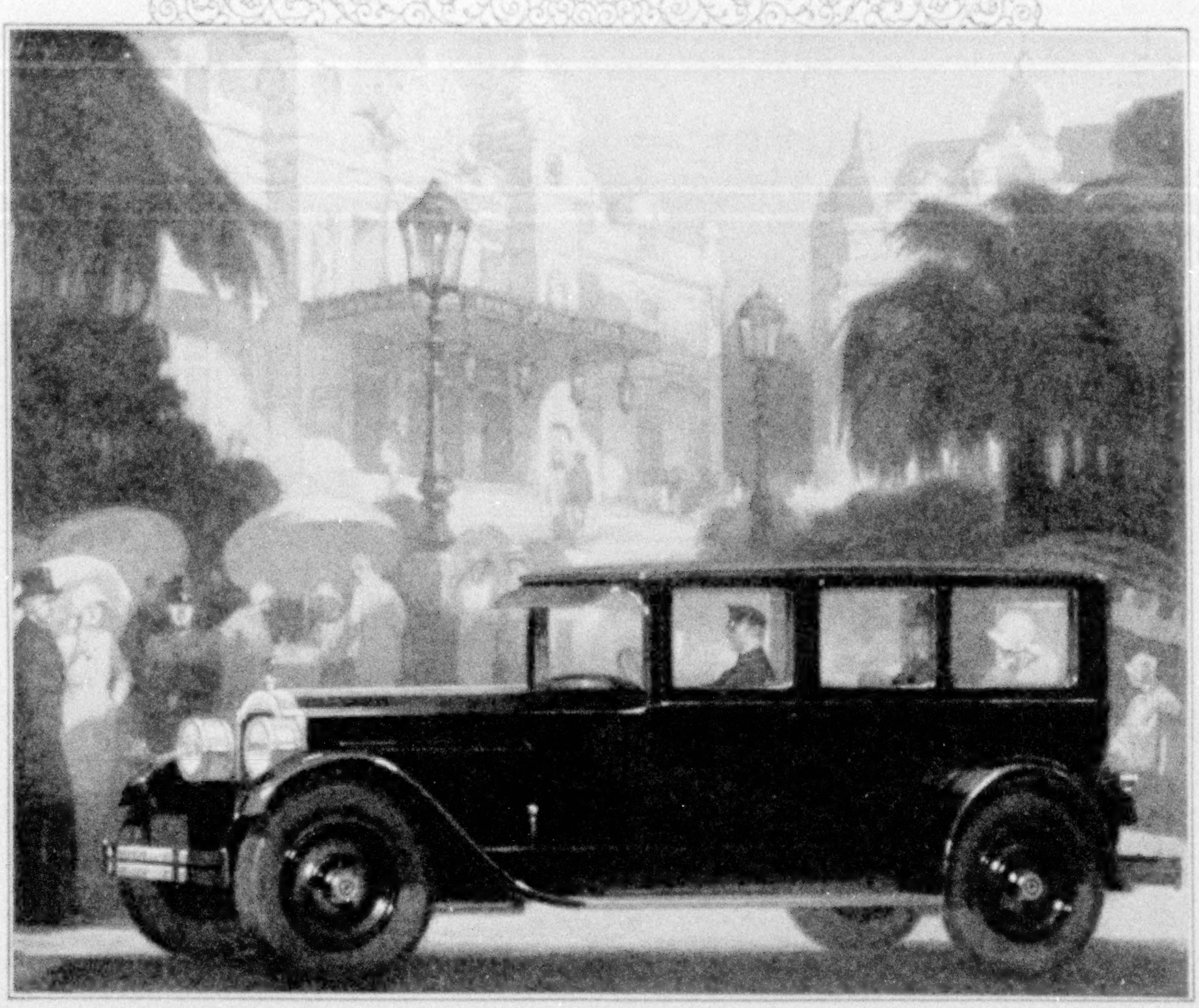


"Your car certainly rides a lot easier than mine, but don't you find that balloon tires wear out faster than cords?"

"Not these; they're Kelly-Springfields."



## —and now at Monte Carlo

THOSE who have been in Europe during the past few seasons will remember the car beauty contests which have been a fad at all the famous watering places on the Continent. *Concours d'Elégance-Automobiles* they are called in France.

In these contests, held where the wealth and fashion of all nations gather at play, the most luxurious special bodies, the world's finest motor cars, are judged for beauty and distinction.

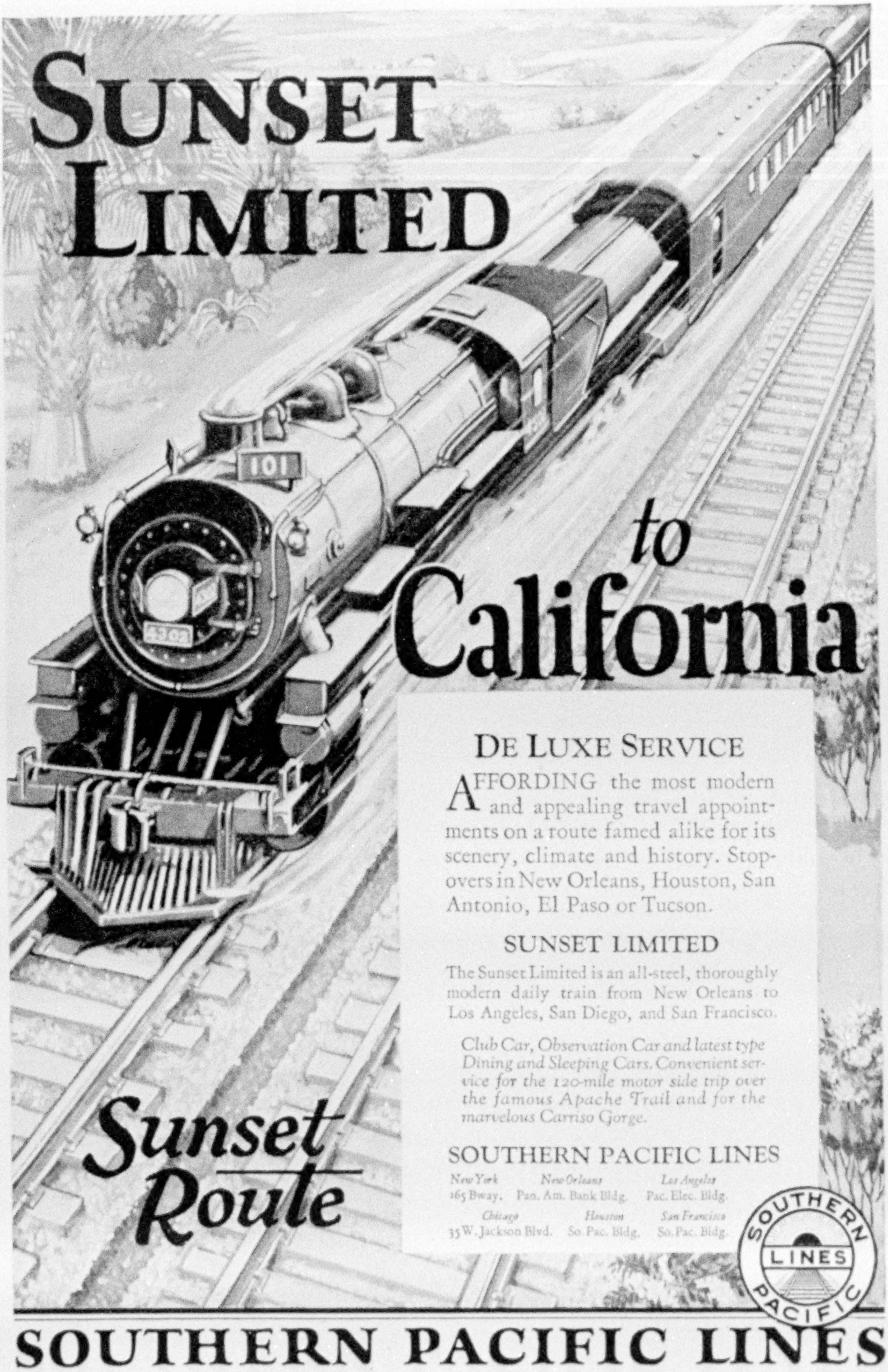
Americans will be proud to learn that a standard American motor car has won first prize in such a competition—not once but eleven times!

Packard cars, entered by their private owners, have won first place for grace and beauty at Vichy, at Le Touquet and at Aix-les-Bains in France. At Wiesbaden, Neuenahr, Trier, and Baden-Baden in Germany. At Oporto in Portugal. And now at Monte Carlo—that cosmopolitan center of luxury and beauty on the Riviera!

Such international acclaim confirms America's verdict—that the unchanging beauty and distinction of Packard lines have yet to be equaled or surpassed.

# PACKARD

*Ask the man who owns one*



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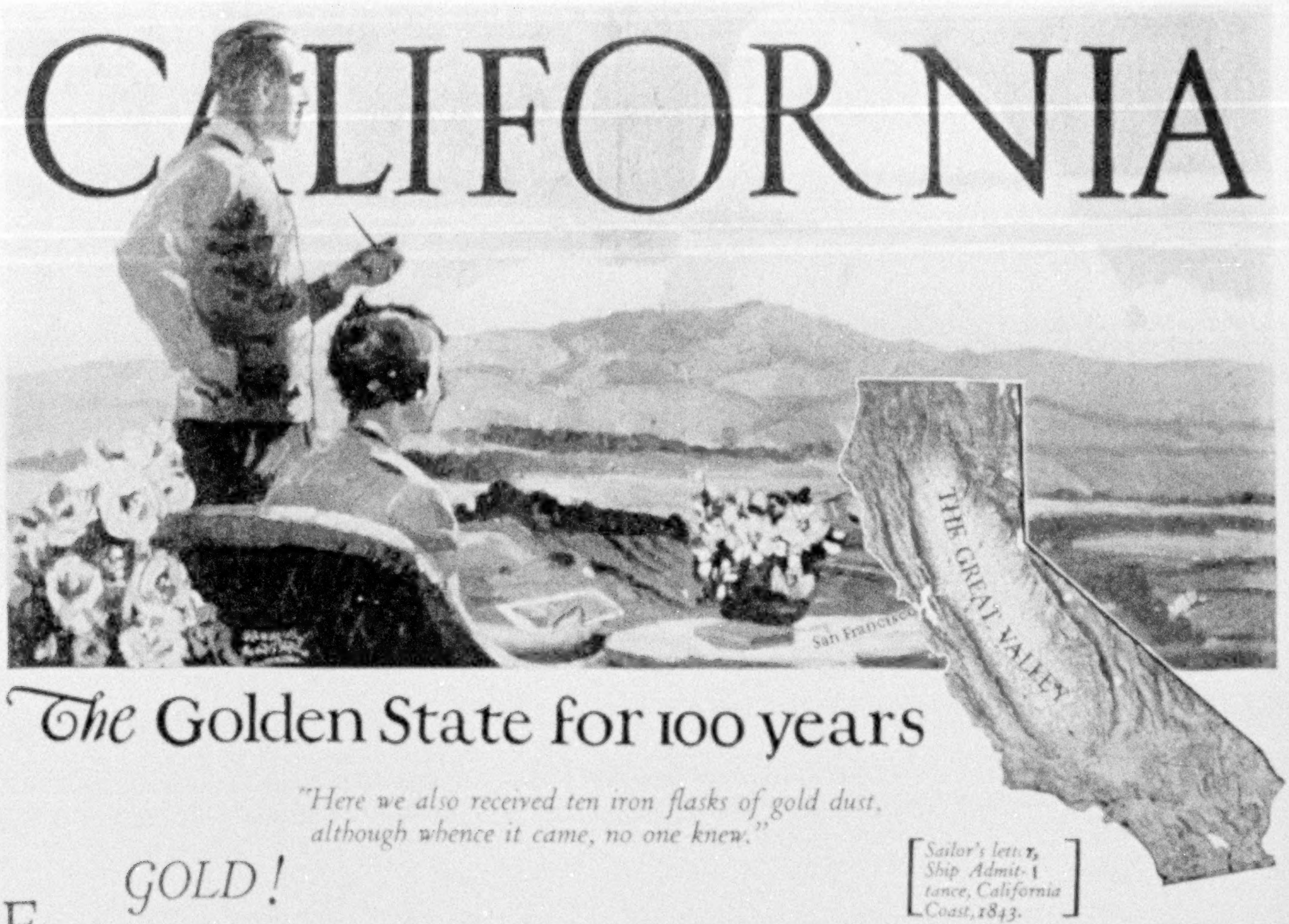
*San Francisco* So. Pac. Bldg.

# SOUTHERN PACIFIC LINES

# CALIFORNIA



# The Golden State for 100 years

*"Here we also received ten iron flasks of gold dust, although whence it came, no one knew."*

[*Sailor's letter, Ship Admittance, California Coast, 1843.*]

## *GOLD!*

FOR a century, Gold has been California's story. Today our wealth is greater, our opportunity more varied, life in California is more golden, than ever. Why not enjoy it with us?

### *Gold in many ways*

Each one of eleven California crops brings us each year more gold than all the gold of 1849—the orange crop, five times as much. Apples, pears, peaches, apricots, prunes, plums, cherries, grapes, raisins by the thousand tons, lemons, figs, olives, almonds, walnuts—each brings its annual millions. Our vegetables sell for sixty million dollars a year, mostly at the high prices of early eastern markets; our field crops bring nearly two hundred millions, our dairy products a hundred and eighteen millions. Hay alone brings one hundred millions.

California is always golden. Twenty different crops each produce more than seven million dollars a year; twenty-three counties produce oranges commercially; every month is a growing month with new crops going to market . . . new gold for Californians. A generation before gold was discovered, California was rich, life was pleasant, exports ran to millions. Today we take more gold from the ground each year than any other state or territory.

### *The world buys our products*

People in other states and countries send us two hundred and fifty million dollars a year for fruits and vegetables we don't need at home, and three hundred million dollars for oil that pours out of the ground and isn't used in our automobiles. Foreign nations buy from us enormously. The Chinese up the Yang-Tse buy California raisins—Germany takes five million dollars' worth of dried fruits—forty foreign lands buying two hundred and fifty million dollars a year all told, shipped from San Francisco, the great export center of the Pacific Coast.

### *Twice the advantages*

Do you wonder that, from 1920 to 1923 California's population increased 18% as against only 4% average in the United States? This year-'round crop-growing climate is a year-'round outdoor climate for flowers and children, and industry as well—a twelve-month cycle of real living in city or country, with, on the average, twice the returns for the same effort—twice the contentment, twice the opportunities for enjoyment, greater health, greater prosperity—more life per year! Already more than 100 eastern manufacturers have established factories in the great San Francisco Industrial district, surrounding San Francisco Bay, the largest land-locked harbor in the world. Here they, also, reap the benefits of California. They manufacture with proved greater labor efficiency, lower overhead, a rich immediate market of prosperous people with money to spend, and direct access at low cost to the Atlantic Coast and world markets.

We invite you to consider California. There's room. There is opportunity. There are a hundred ways to greater success for the man and the family with moderate capital who can succeed elsewhere. You know best which way is yours. Two-thirds of our people live in cities of 20,000 or more with their opportunities for industry. Businesses and professions carried on among a prosperous people with money to spend. Think of the Great Central Valley, and its adjoining valleys, with two-thirds the productive land and two-thirds of the production of the entire state, with its rich cities, linked by superb highways, and all leading into San Francisco, the industrial and commercial capital of the Pacific Coast—no pioneering, no waiting—rich for a hundred years and richer than ever today.

### *Let us tell you more*

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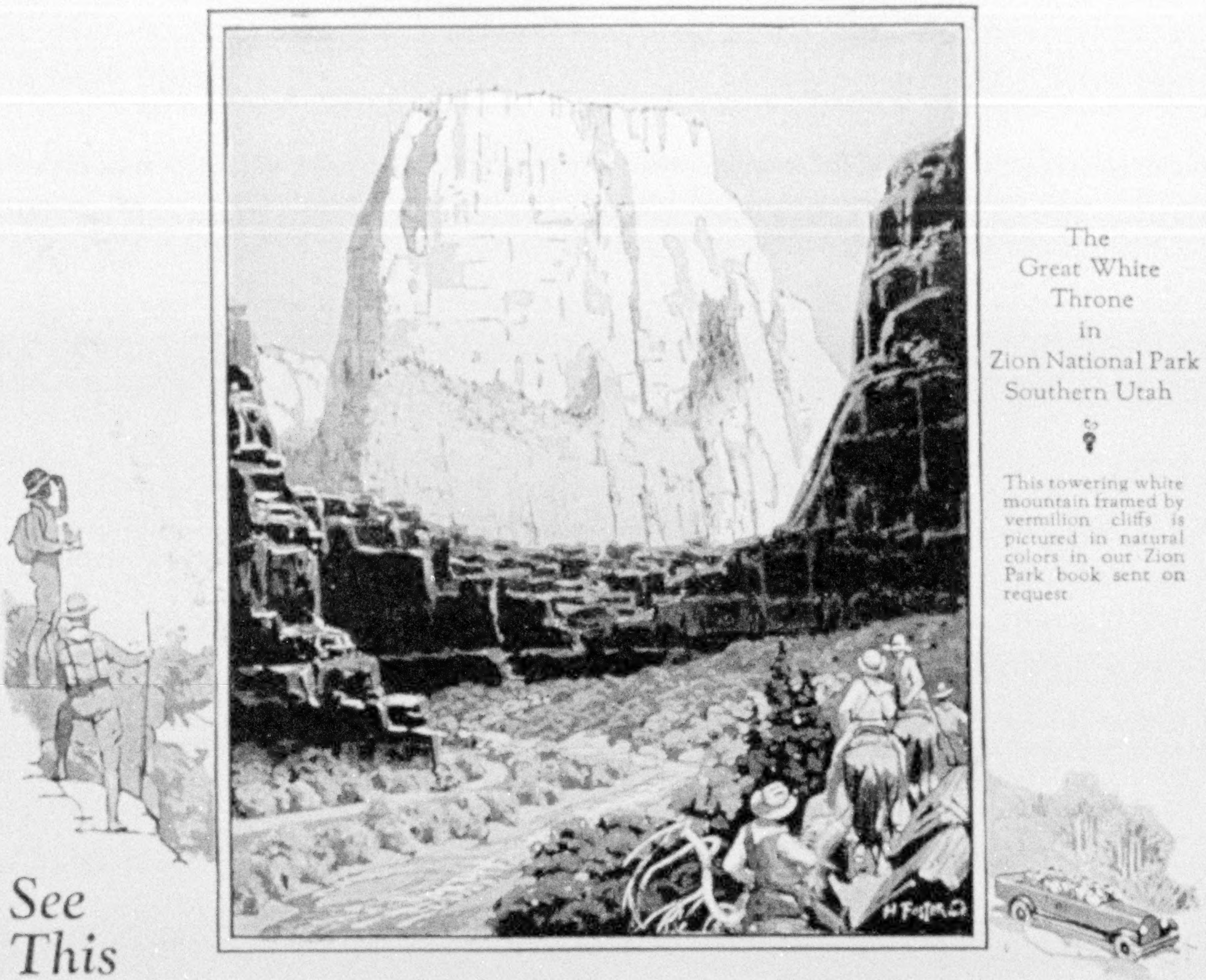

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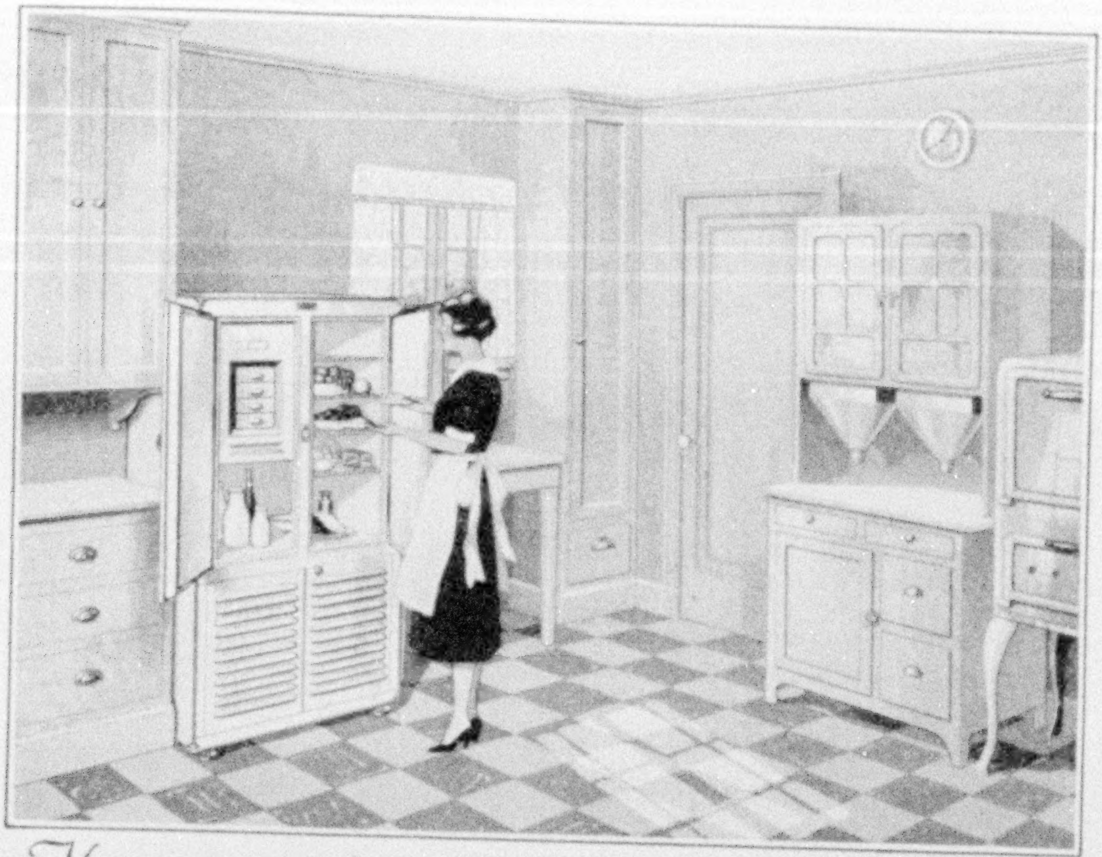
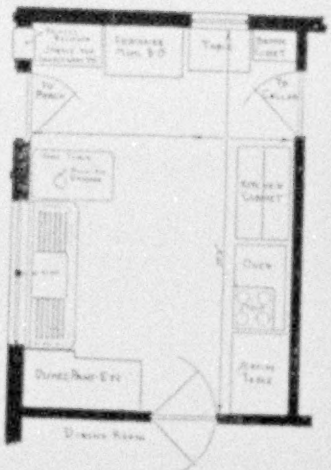


*—"and this beautiful kitchen won the First Prize"*



*The design shown here in both perspective and plan won the First Prize in the Frigidaire Architectural Competition. It was submitted by Mr. Harry P. Braisted, of New Haven, Connecticut.*

## *May we send you—*
## A Book *of* Prize-Winning Kitchens, Equipped with Frigidaire

THE development of Frigidaire electric refrigeration has brought about a new type of kitchen architecture—more convenient, more attractive, more efficient—designed without the handicap of providing for an outside ice supply.

Such a kitchen is illustrated above in perspective and plan. It was the winner of first prize in a nation-wide architectural competition, in which plans submitted were judged by Miss Katherine A. Fisher, of Good Housekeeping, Miss Mabel Jewett Crosby, of the Ladies' Home Journal, and Messrs. Charles A. Schneider, James Wilson Thomas and John Henri Deeken, prominent and successful residence architects.

And now we offer to the women of America a beautiful bound collection of the most interesting and valuable of these plans, together with the comments of the Jury of Award. They contain many ingenious suggestions for time-saving and labor-saving kitchen arrangements. They show how the use of Frigidaire can greatly improve the plan of kitchens for new homes—and they show, too, how Frigidaire, installed in your own ice-box, can produce a remarkable transformation in the convenience and efficiency of your present kitchen.

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Frigidaire Competition

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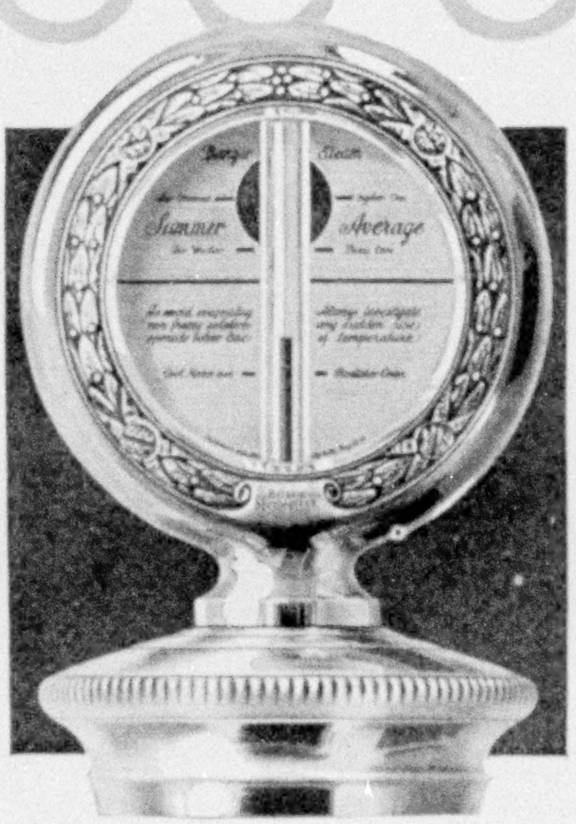
# DIRECTLY BEFORE THE EYES OF EIGHT MILLION DRIVERS

8,000,000



*Standard Model — Ten Dollars*

WHEN nearly half of all the drivers in America have already selected the Boyce Moto Meter as their insurance against damage from overheating there must be good reason. There is.

. . .

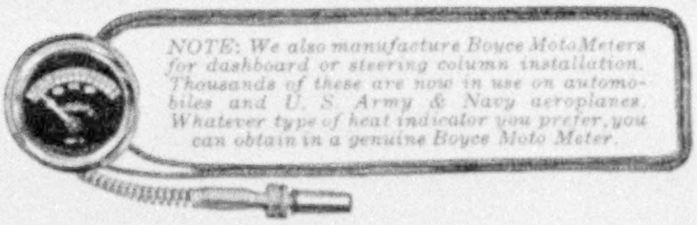
These eight million know, as the makers of Boyce Moto Meters knew 12 years ago, that the logical place for a motor heat indicator is on the radiator cap, always in the direct line of driving vision, where it is not necessary to shift the eyes from the road to the crowded dashboard.

. . .

They realize too that in the Boyce Moto Meter they have a constant safeguard for their motor — an instrument which never requires adjustment and outlives any car. Its noticeable rise will always enable you to detect motor trouble. Its unique combination of beauty and downright utility makes it not merely a radiator ornament of the moment, but the permanent mark of the driver who is kind to his motor.

. . .

Dealers everywhere have the Boyce Moto Meter on sale in various designs, models and prices—$3.50 to $15.00. Three minutes after you buy it, the Boyce Moto Meter starts to guard your motor.



*NOTE: We also manufacture Boyce MotoMeters for dashboard or steering column installation. Thousands of these are now in use on automobiles and U. S. Army & Navy aeroplanes. Whatever type of heat indicator you prefer, you can obtain in a genuine Boyce Moto Meter.*

**BOYCE**

**MOTO METER**

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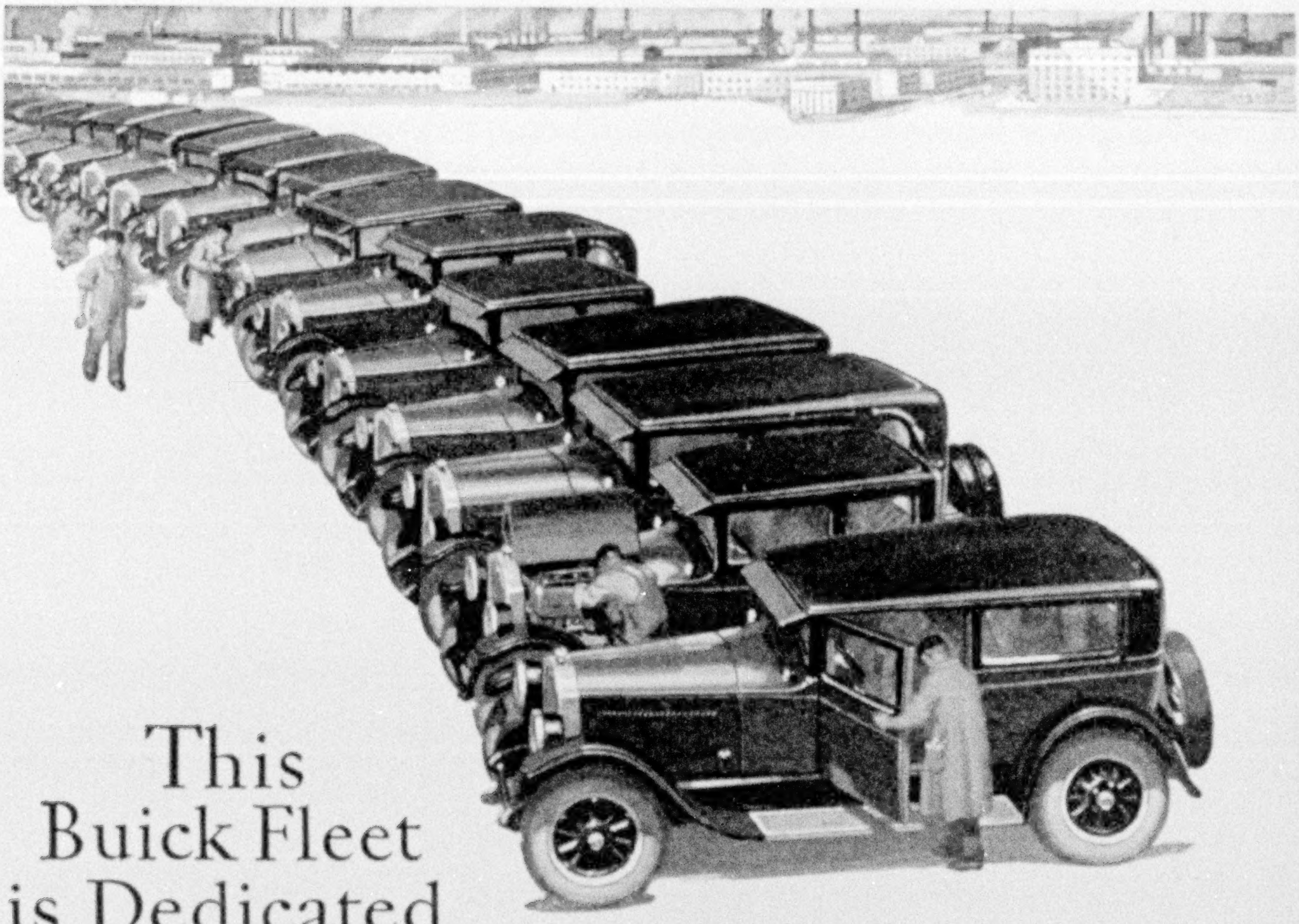


# This Buick Fleet is Dedicated *to* Wear

▾

*No owner gives his car in years, the punishment the Buick test fleet takes in weeks.*

Fifteen, and sometimes twenty Buicks line up for the inspection of the heads of the Buick engineering and experimental department each working morning of the year. This is the Buick "squadron of wear." In the previous twenty-four hours each of them has added from 300 to 500 miles to the mileage on its speedometer.

Day and night these cars go. Not on the highways, where sustained speed is impossible, but on the roadways of the great General Motors Proving Ground. Here every highway condition is provided; hills, curves, straightaways, gravel, pavement.

Sometimes, when Buick engineers desire particular information as to performance in different parts of the country, the Buick fleet goes where the condition required is to be found.

Buick engineering believes in accuracy. Test, not guess, is the basis for certainty. An improvement suggested is adopted only when the test cars prove its value.

Day after day, year after year, they drive on and on—5,000 miles a day, 1,500,000 miles a year, these cars total in their search for wear. This, that every Buick may be an example of how well a motor car can be built.

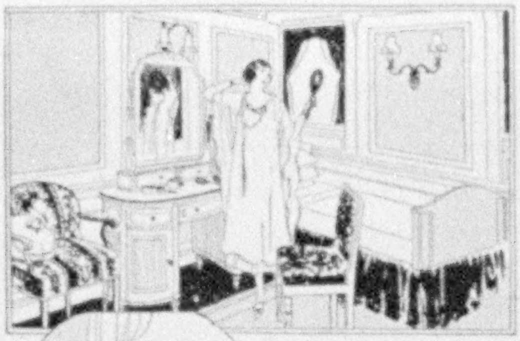
Research in the practical laboratory of the road is one big reason why Buick leads in motor car advancement. 5,000 miles a day, devoted to wear, means *Better Buicks!*

*The Better* BUICK

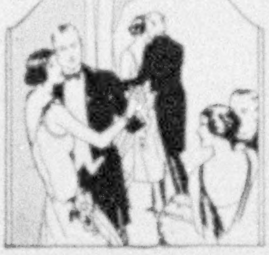
BUICK MOTOR COMPANY, FLINT, MICH.
*Division of General Motors Corporation*
*Canadian Factories:*
McLAUGHLIN-BUICK, *Oshawa, Ontario*
Branches in all Principal Cities—Dealers Everywhere
Pioneer Builders of Valve-in-Head Motor Cars

WHEN BETTER AUTOMOBILES ARE BUILT · BUICK WILL BUILD THEM

# SAIL ON THE HOMERIC



*Smartly equipped rooms with furnishings of exquisite taste and appointments to meet the needs of those who are accustomed to every comfort.*



*Dancing on the parquet floor of the Homeric's spacious lounge.*

## Company's Offices

| | |
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| Atlanta | Haas-Howell Bldg. |
| Baltimore | 308 North Charles Street |
| Boston | 84 State Street |
| Calgary, Alberta | Land Building |
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| Cleveland | 1951 East 6th Street |
| Dallas | Cotton Exchange Building |
| Detroit | Majestic Building |
| Galveston | Cotton Exchange Building |
| Halifax | 126 Hollis Street |
| Houston | Cotton Exchange Building |
| Los Angeles | 510 So. Spring Street |
| Minneapolis | 121 S. Third Street |
| Mobile | 7 St. Michael Street |
| Montreal | McGill Building |
| New Orleans | 219 St. Charles Street |
| New York | No. 1 Broadway |
| Norfolk | Flatiron Building |
| Philadelphia | 15th and Locust Streets |
| Pittsburgh | Arcade, Union Trust Bldg. |
| Portland, Me. | 690 Congress Street |
| Quebec | 53 Dalhousie Street |
| St. John, N. B. | 108 Prince William St. |
| St. Louis | 1019 Pine St. |
| San Francisco | 460 Market Street |
| Seattle | 619 Second Avenue |
| Toronto | 55 King Street, East |
| Vancouver | Granville and Pender Sts. |
| Washington | 1208 F. St., N.W. |
| Winnipeg | 286 Main Street |

*or any authorized steamship agent.*

*Sailings from New York, Boston and Montreal to all principal European ports.*

Write us about your travel problem. We shall be pleased to send you literature and helpful information.

SAIL on the *Homeric* for pleasure-crowded days of ease. Broad decks to stroll on, great salons to lounge in, modernly perfect rooms to live in. All in all, the sort of ship one takes again and again—because she has an unobtrusive air of extreme luxury.

The *Homeric* together with the famous ***Olympic*** and the ***Majestic,*** world's largest liner, compose the White Star Line's Magnificent Trio. They maintain a regular service of Saturday sailings from New York to Cherbourg and Southampton.

### LIVERPOOL WEEKLY SERVICE

For more leisurely crossings we suggest our famous Big Four to Liverpool calling at Queenstown.

***Adriatic*** ***Baltic*** ***Cedric*** ***Celtic***

A weekly service is also maintained to Liverpool from Montreal via the short, scenic St. Lawrence route. Only four and one-half days on the open sea.

### LONDON FORTNIGHTLY SERVICE

Two new ships of unique attraction, carrying First Class passengers only

***Minnewaska*** ***Minnetonka***

You debark in the heart of London—taxi to your hotel. (Call at Cherbourg eastbound.)

### ANTWERP WEEKLY SERVICE

To Antwerp, the tourists' convenient gateway to Europe. Four splendid ships which offer a complete range of types and prices of accommodation.

***Belgenland*** ***Lapland***
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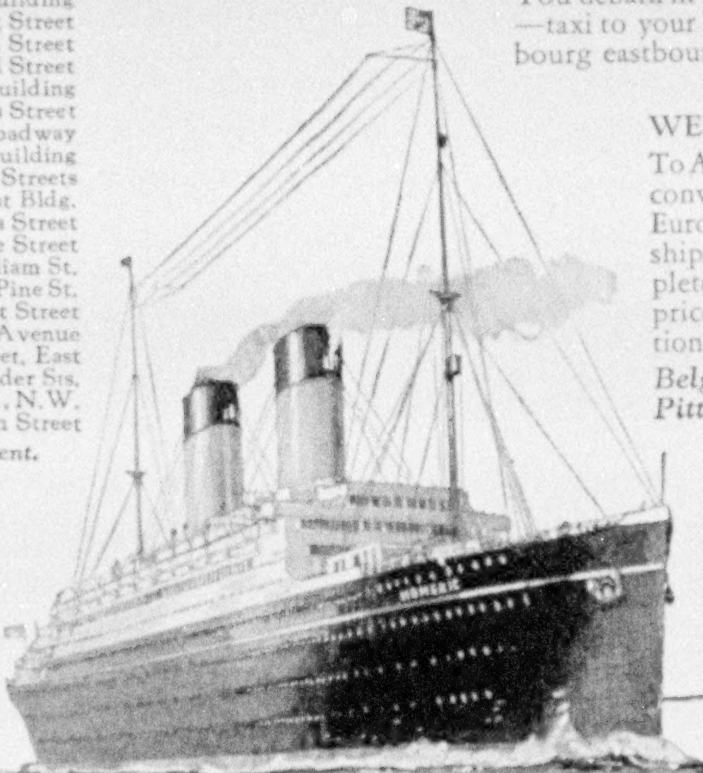
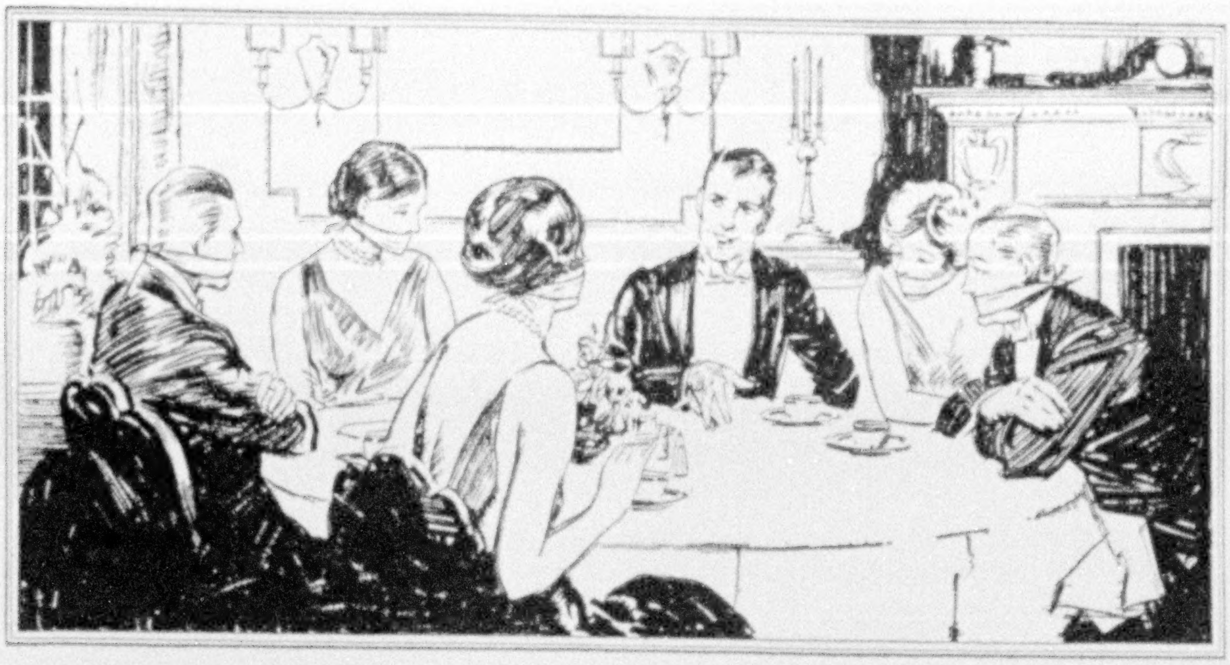


Homeric
*The Ship of Splendor*

# WHITE STAR LINE
## ATLANTIC TRANSPORT LINE · RED STAR LINE
## INTERNATIONAL MERCANTILE MARINE COMPANY



# -and Everybody Else Seemed *Speechless!*

HE looked around the table. To think that he had been afraid—had hesitated about coming to this dinner-party! Among all these important and cultivated people, he alone could speak easily and with calm assurance of literature, history, philosophy, art.

These others—they seemed speechless! They all turned to him with questions, amazed at his great fund of information.

At first they had hardly noticed him at all. He had seemed so quiet and unassuming. But then conversation began to lag. Not even the latest murder trial could revive it. No one seemed to know what to say.

"I wonder if capital punishment will ever be abolished," someone ventured.

"More than a generation ago," said the quiet guest whom nobody had noticed, "Victor Hugo predicted, that the dawn of the twentieth century would see the end of hangings. His prediction hasn't come true yet."

### Why They Began to Notice Him

Everyone looked at him. He spoke so confidently. He saw that they were interested, and he continued to speak. He knew what to say, and he said it with the assurance and ease of one whose mind is simply stored with information.

And suddenly he realized that he was being noticed, admired. He saw now how valuable it is to have a well-furnished mind. He was the best-informed man at this dinner! He could talk readily and authoritatively on almost any subject.

He answered all their eager questions. He quoted from Nietzche and Bernard Shaw. He spoke of Rossetti and Keats. He repeated fragments from the writings of Tolstoy and Robert Ingersoll. They listened fascinated. Everybody else seemed speechless! This man seemed to know about *everything*.

### How Did He Acquire His Great Store of Information?

"How do you ever get the time to read so much?" someone asked him at last.

"I really read very little," he answered with a smile. "Every now and then I browse a bit in Elbert Hubbard's famous Scrap Book. It's a digest of the best thoughts and ideas of the last four thousand years, and it gives you all the information you want in a few words—without wading through great, ponderous volumes. Hubbard used this same Scrap Book to inspire him in his work—in his writings and speaking."

"But can anyone own this remarkable Scrap Book?"

"The executors of Hubbard's estate agreed to its publication because they realized it would be so valuable and inspiring to people. Now anyone can buy it for the price of an ordinary best-seller!"

**The Elbert Hubbard Scrap Book**

is a fine example of Roycroft bookmaking. The type is set Venetian style—that is, a page within a page—and printed in two colors on high-grade tinted book paper. It is bound Scrap Book style and tied with linen tape. The covers reproduce the binding of Elbert Hubbard's famous magazine, "The Philistine."

### Examine Elbert Hubbard's Famous Scrap Book *Free for Five Days!*

The coupon below will bring you for *free examination* the astonishing Elbert Hubbard Scrap Book.

If you are stimulated and inspired by it, keep it and send only $2.90 plus a few cents postage in full payment. Otherwise return it within 5 days and the examination will have cost you nothing.

Act NOW before you forget. Become a more interesting talker—see how it increases your popularity. Send this coupon at once. Wm. H. Wise & Co., Roycroft Distributors, Dept. 174, 50 West 47th Street, New York City.

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You may send me for five days' free examination a copy of Elbert Hubbard's Scrap Book in the cloth-lined butcher paper binding. Within the five-day period I will either return the Scrap Book without obligation or keep it for my own, sending you only $2.90 plus few cents postage in full payment.

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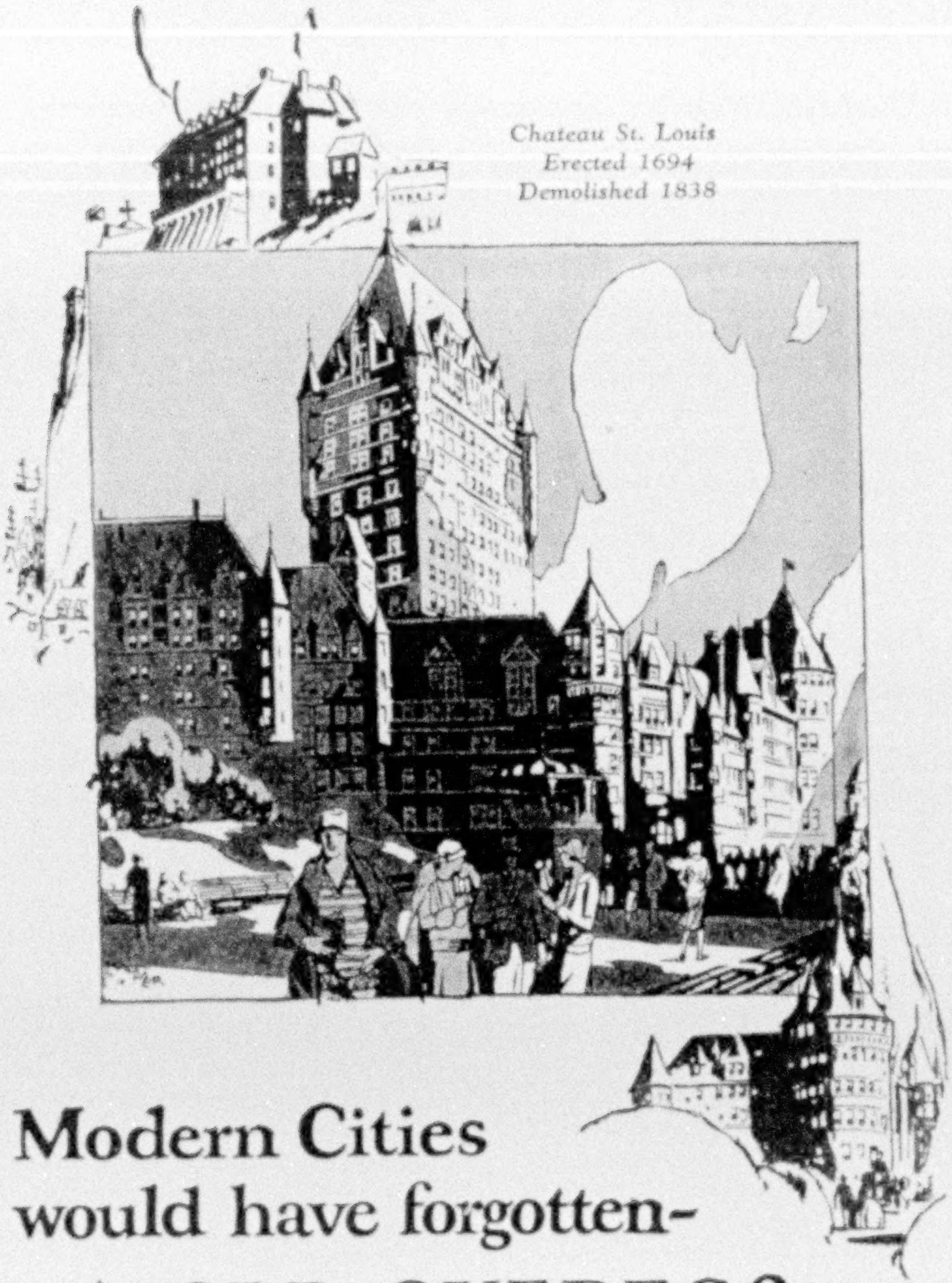
☐ A few copies are available in a de luxe binding of semi-flexible basket weave buckram for only $1 additional. Please check in the square at the left if you want this de luxe binding, with the same return privilege.



# Modern Cities would have forgotten—
# *but* OLD QUEBEC?

ON THE cliff of Old Quebec is America's most romantic site. . . . There, in 1620, France built her stronghold in the New World, Ft. St. Louis. In 1694, her governor's mansion, Chateau Louis. Round them raged 150 years of struggle for empire. . . . There, in 1892, Canadian Pacific built another medieval chateau—Chateau Frontenac, hostelry extraordinary. Chateau Frontenac grew. First, a long wing. Then, more wings, towers. Finally, in 1923, a great keep rose to the sky. The original chateau shrunk to a mere out-tower. But, to Old Quebec, it held all the sentiment of that historic site. . . . And so, this original out-tower is being restored. . . . Today you find within Chateau Frontenac's castled walls 550 rooms. This June you will find the original tower fully restored. This spring! Surely a dramatic time to visit "Normandy in America." Early reservations are advised. Canadian Pacific, 334 Madison Ave., New York; 71 East Jackson Blvd., Chicago; or, Chateau Frontenac, Quebec, Can.

## CHATEAU FRONTENAC

BIENVENUE À QUÉBEC

Raymond-Whitcomb

## Midnight Sun Cruise

*Sailing June 29th for*

Iceland North Cape : Fjords
Bergen : Trondhjem : Oslo
Copenhagen : with side-trips
to Stockholm & Gothenburg.

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This is the supreme summer voyage ❦ Long restful days at sea, with the luxurious comfort that can be found only on a great liner — frequent shore excursions that visit the most beautiful & important places in *Norway*—a management skilled in Norwegian travel. It is pre-eminently THE VACATION CRUISE.

The Cruise-Ship is the 20,000-ton "*Carinthia*"—the newest Cunard liner ❦ The rates—which include return any time this year—are $800 & upward.

Send for booklet *The Midnight Sun* & ship-plans.

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## *Two ways to* EUROPE

*Raymond-Whitcomb Tours* are accepted as models of escorted travel. They are diverse, comprehensive, smoothly operated & include much automobiling. Thirty-nine tours (covering eleven routes) sail from May to August and last from two to three months.

*Raymond-Whitcomb Individual Travel Service* was devised for those who wish to travel without escort. Raymond-Whitcomb will arrange routes to meet individual desires and will secure accommodations and make complete preparations for trips of any length.

*Send for Europe Tour Books & Guides to European Travel*

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## Round the World Cruise

*Sailing October 14, 1926, on the new Cunard liner "Carinthia"*

The most attractive Round the World Cruise ever announced.

*This is the only cruise ever to visit* Australia, New Zealand, Tasmania, *and* Korea *in addition to* Japan, China, Philippines, *and* India—*fascinating countries of the Far East that have always been great features of a Round the World Cruise.*

Other special attractions are a four-day visit to *Peking*, and (for the first time) an included trip to the *Great Wall of China.*

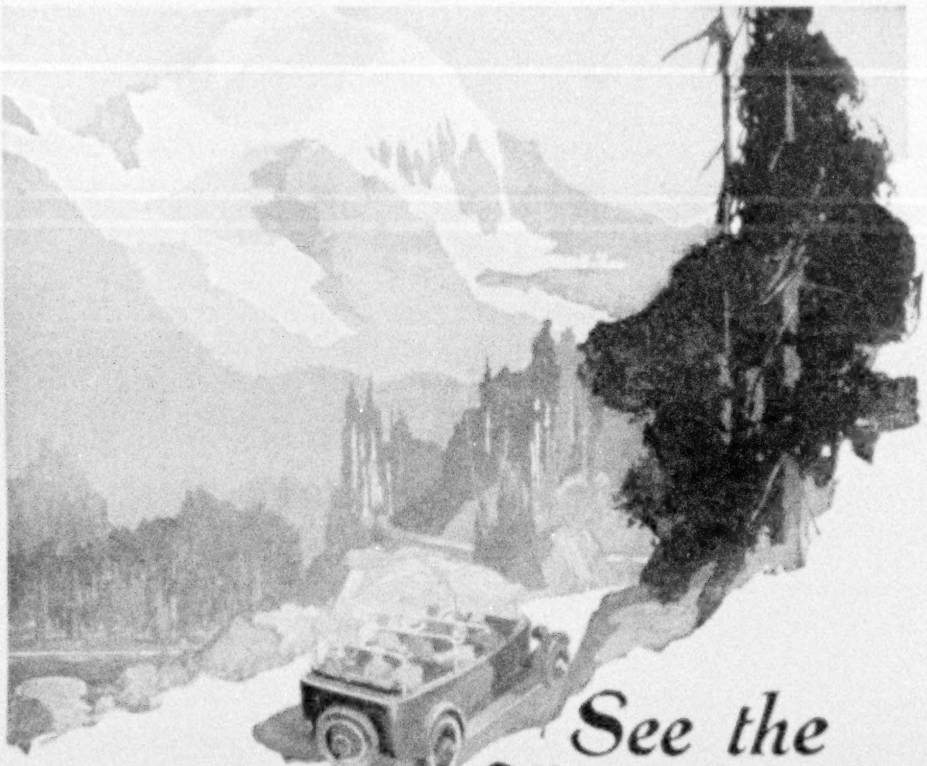
The Cruise sails westward in the Autumn, and the passengers may join at New York, Los Angeles, or San Francisco. It is timed to be in every country at the best season, & to arrive at Europe (after making the circuit of the world) for a Spring visit before sailing for America. Return passage at any time during the year is included in the cruise rates.

*$2250 and upward. Write for the Cruise Booklet.*

**RAYMOND & WHITCOMB CO.**

*Executive Offices:* **26 Beacon Street, Boston**

New York Philadelphia Chicago San Francisco Los Angeles



# See the Wonders of Jasper National Park

## *Canada's famous playground in the heart of the Canadian Rockies*

A land of haunting beauty 4400 square miles in area; sky-piercing mountains, colossal glaciers, torrential rivers, foam-flaked rapids, placid mirror-like lakes, cool deep forests and amid all this a splendid golf course, winding bridle paths and shady nooks—can you resist a vacation in Jasper National Park?

Your comfort is looked after at Jasper Park Lodge ($6.50 a day up—American Plan—open May 22nd to September 30th, accommodations for 400 guests). Every recreation is provided—dancing, bathing, boating, mountain climbing and hiking with competent Swiss Guides—and the wonderful social life at the Lodge.

After a stay at Jasper, take the famous Triangle Tour of British Columbia. By train down the valley of the Mystic Skeena to Prince Rupert—by palatial steamer through sheltered scenic seas to Vancouver and by train back to Jasper through the roaring gorges of Thompson and Fraser Rivers.

*Golf Week at Jasper, September 11th to 18th, 1926*

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**Seattle**
*902 Second Ave.*

*For information concerning Jasper National Park, send this coupon to our nearest office or call for the booklets listed.*

CANADIAN NATIONAL RAILWAYS

Please send me your free booklet on Jasper National Park; also Tourist Map of Canada.

Name ........................................................................................

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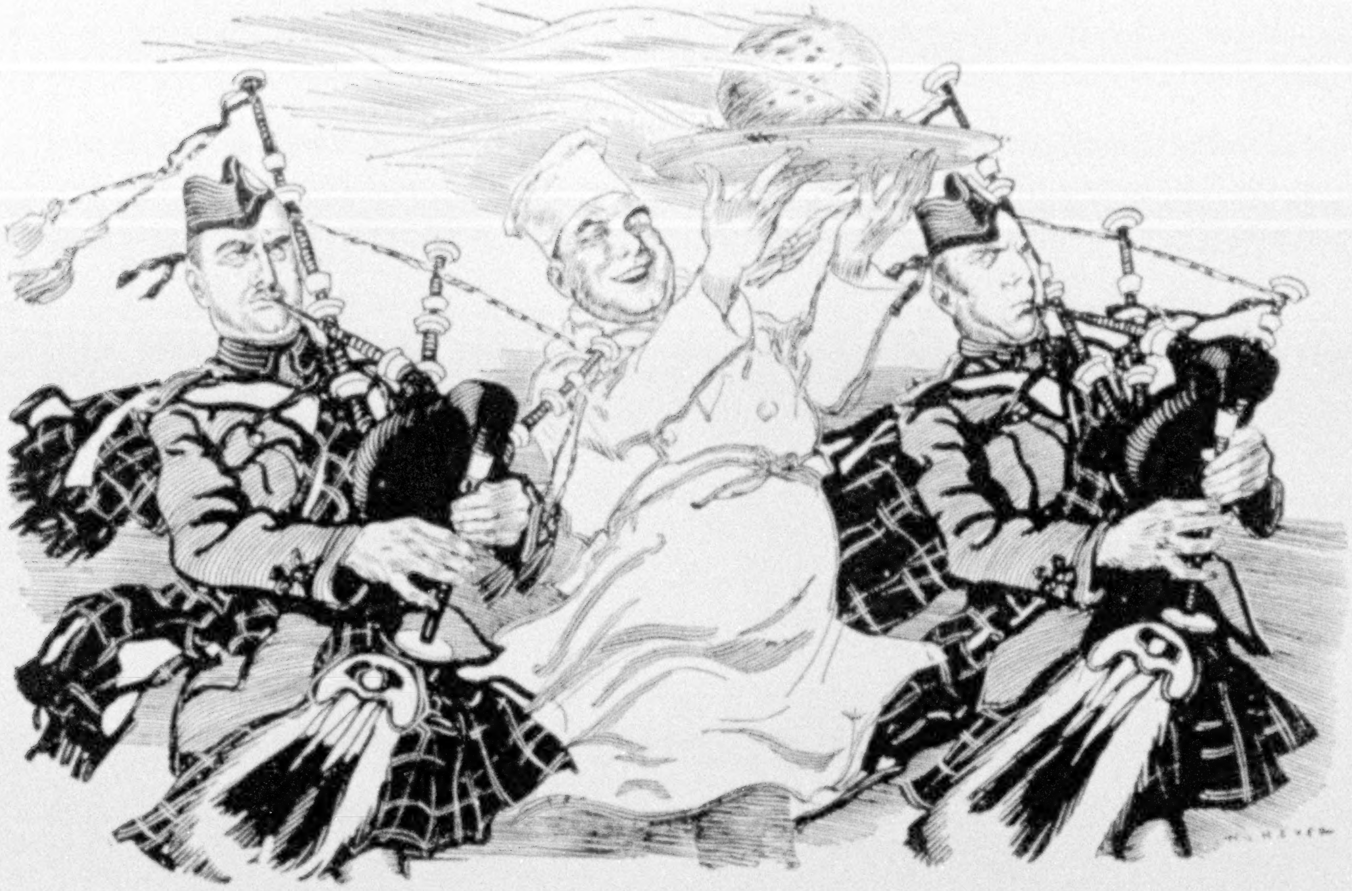
# CANADIAN NATIONAL

*The Largest Railway System in America*

Nat. Geo.-2



*The piping in of the pudding — an oldtime Christmas ceremony on Cunard and Anchor Liners*

# *The Proof of the Pudding*

During 1925 CUNARD and Associated Lines carried *226301 passengers* to and from Europe - again the largest number traveling by any one line or group of lines on the Atlantic. To the public which has made possible this result deep appreciation is expressed with the assurance that no effort will be spared to enhance still further the service we have rendered during the last 86 years. Cunard ships, rates and routes now offer such a variety of ways to and from Europe as to suit every purse and every taste.

## The Zenith of Ocean Travel

*is represented in our weekly service*
*from New York to Cherbourg and Southampton*
—The World's Fastest Ocean Passenger Service De Luxe—

*Other Cunard services to choose from are:* the exceptionally comfortable weekly services to Queenstown - Liverpool — to Londonderry-Glasgow; the very attractive new weekly Cabin Services to Plymouth, Cherbourg and London; the service to Plymouth, Cherbourg and Hamburg and the famous Cunard Vacation Specials (Third Cabin).

*Requests for sailing schedules, rates and literature cordially invited.*

**CUNARD and ANCHOR Lines**
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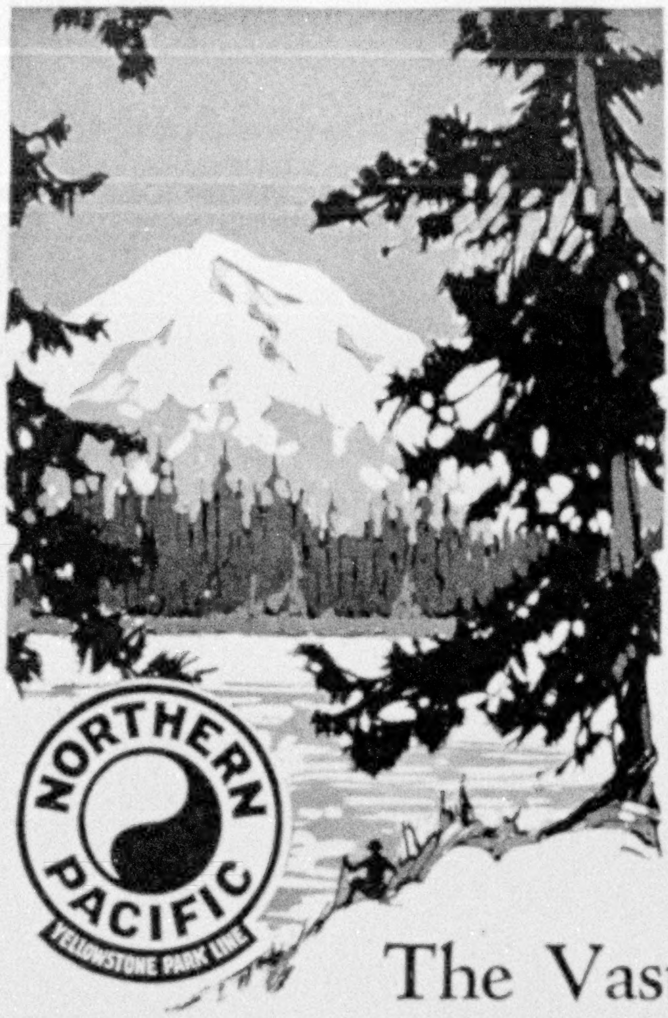
To travel to or from
SCOTLAND
choose one of the magnificent new Anchor Liners CALEDONIA, TRANSYLVANIA, CALIFORNIA, TUSCANIA — second to none in luxurious comfort, appointments and service.

**To EUROPE**

**Travel by the Famous CUNARD HIGHWAY**



# The Vast Pacific Northwest

Mountains that vault the sky—
Silence—
Broken only by the whisperings of the wind in the forests of fragrant fir—
Glorious stretches of incomparable beauty—far-flung horizons—
Joyous outdoor play—sunlight—blue skies.

Realize the ideal vacation—visit the Pacific Northwest this summer. Stop at Yellowstone National Park.

Our illustrated booklets will help you plan your trip. May we send them to you?

## Northern Pacific Ry.

*"First of the Northern Transcontinentals"*

Mail this coupon to A. B. Smith, 839 N. P. Bldg., St. Paul, Minn.

MY VACATION TRIP

*Name* ______________________________

*Address* ______________________________

NORTHERN PACIFIC
YELLOWSTONE PARK LINE

| **Books or trips I am interested in: ( √ )** | | Round Trip Summer Fare from Chicago |
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| ☐ Yellowstone Park . . | | $ 59.35 |
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*I'll gladly make your Hotel or Pullman Reservations.*

*"Route of the North Coast Limited"*

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# *Kampkook Saved the Day!*

FEED him quick—and he forgets the fish that got away. It's tough to lose the big ones, but there is satisfaction in eating those you did land, when they are fried to order or baked to a turn on ***Kampkook.***

***Kampkook*** is the all-weather camp stove—burners fully protected against the wind. It's speedy, cooks or bakes like a range, using roadside gasoline for fuel. Up and going full blast in a jiffy, packs away for traveling just as quickly and carries like a grip.

Name of nearest dealer sent on request if yours cannot supply you.

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AMERICAS MOST POPULAR CAMP STOVE

*Write for free copy of* ***"Kampkookery,"***
*a valuable handbook on motor camping.*
*Address nearest office, Dept. 61.*

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# Niagara to the Sea

The most satisfying trip in America for health and recreation. Almost 1000 miles of lakes, rivers, and rapids, including the Thousand Islands, the exciting descent of the marvelous rapids, the historic associations of Montreal, quaint old Quebec, with its famous miracle-working Shrine of Ste. Anne de Beaupré and the renowned Saguenay River, with its stupendous Capes, "Trinity" and "Eternity", higher than Gibraltar.

Write for illustrated booklet, "Niagara to the Sea", including map and guide, to JOHN F. PIERCE, Pass. Traffic Manager, Canada Steamship Lines, Ltd., 107 C. S. L. Building, Montreal, Canada.

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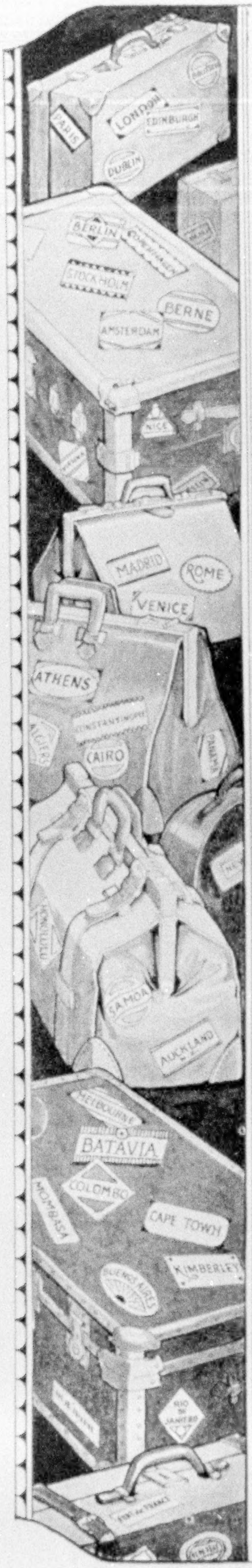
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*—Itineraries for individual travel at any time, embodying your own particular aims.*

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*—Large selection of popular tours by the comfortable new Third Cabin Services.*

*—Cruises to North Cape, Norwegian Fjords and Northern Capitals.*

*—Annual Summer Cruise around the Mediterranean on the S. S. "California"—July 1st to August 31st.*

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*COOK'S TRAVELLERS' CHEQUES GOOD EVERYWHERE*

## Europe by Motor

Most complete facilities for arranging motor car tours at any time. Highest type cars only.

Agents for principal Air Services.

NOTICE: During April Cook's Head Offices in London will be transferred to Berkeley Street, Piccadilly, London, W 1.

1927

## Cruises Supreme

**Around the World**
via the
**Southern Hemisphere**
on the Famous Cunarder
"FRANCONIA"
*Sailing from New York*
January 12, 1927

To the
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on the White Star
"Ship of Splendor"
"HOMERIC"
*Sailing from New York*
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*Full particulars on request*

**THOS. COOK & SON**

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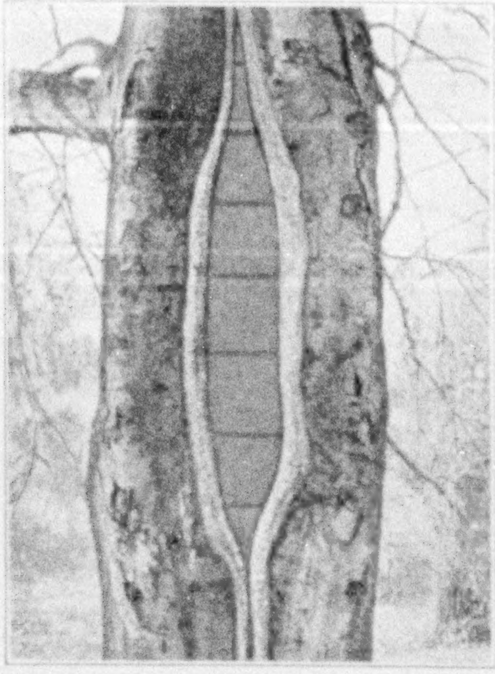

*Beech tree, estate of John B. Stetson, Jr., Elkins Park, Pa., treated and saved by Davey Tree Surgeons. New bark along both edges is healing perfectly over Davey cement filling*

## Nearly $2,000,000 for Davey Tree Surgery in 1925

The Davey Tree Expert Company did a volume of business of nearly $2,000,000 last year, and the only thing they have to sell is *personal service*—the service of highly trained, professional Tree Surgeons, whose work is mechanically perfect and scientifically accurate.

Last year Davey Tree Surgeons served 13,086 clients—an average of less than $150 per client—from Boston to Kansas City, and from Canada to the Gulf. There are nearly 700 of these master Tree Surgeons, some of whom live and work in your vicinity, within easy motoring distance of your home. They are quickly available and no carfare is charged.

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401 City Bank Building
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*Attach this coupon to your letterhead and mail today*

*Reg. U.S. Pat. Off.*

JOHN DAVEY
*Father of Tree Surgery*

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Gentlemen: Without cost or obligation on my part, please have your local representative examine my trees and advise me as to their condition and needs.

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*As Outdoor Life Awakens, Take*

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*with* **Filmo** *Automatic*

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The World's Highest Quality

**MOTION PICTURE CAMERA**

for the Individual

*The tubular "spyglass" viewfinder used on the FILMO camera is a distinctive feature originated and used exclusively by this company.*

*Easy as sighting a spyglass*

THE awakening of Spring invites you out of doors to take personal movies of your sports, travels, the family, and all other action. FILMO, the world's highest quality Motion Picture Camera for the individual, makes it possible for you to take professional quality motion pictures easier than you formerly took snap shots. Just hold FILMO to the eye, press the button, and "what you see, you get," automatically. No cranking. No tripod necessary. Pictures are shown on wall or screen with the FILMO electrically operated Projector. Designed by the world's largest producers of motion picture equipment. Sold by best dealers. *Write for descriptive booklet, "What You See, You Get."*

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*Special Cruises via Spanish Americas*

SAIL away in comfort on balmy seas to lands of tropic lore,—two interest-crammed days at Panama Canal, visits at fascinating ports, Colombia, Nicaragua, Salvador, Guatemala and Mexico, thence to Los Angeles and San Francisco. Oil burning steamers, built for the tropics, highest standards of efficiency, all outside rooms, beds not berths, cabins deluxe, lounges, broad open decks, music, excellent cuisine. Cruise fares $250 and up.

Monthly cruises also from San Francisco and Los Angeles east bound, calling at Mexico, Central America, Panama and Havana to New York. *Write for Booklet N.*

**PANAMA MAIL LINE**
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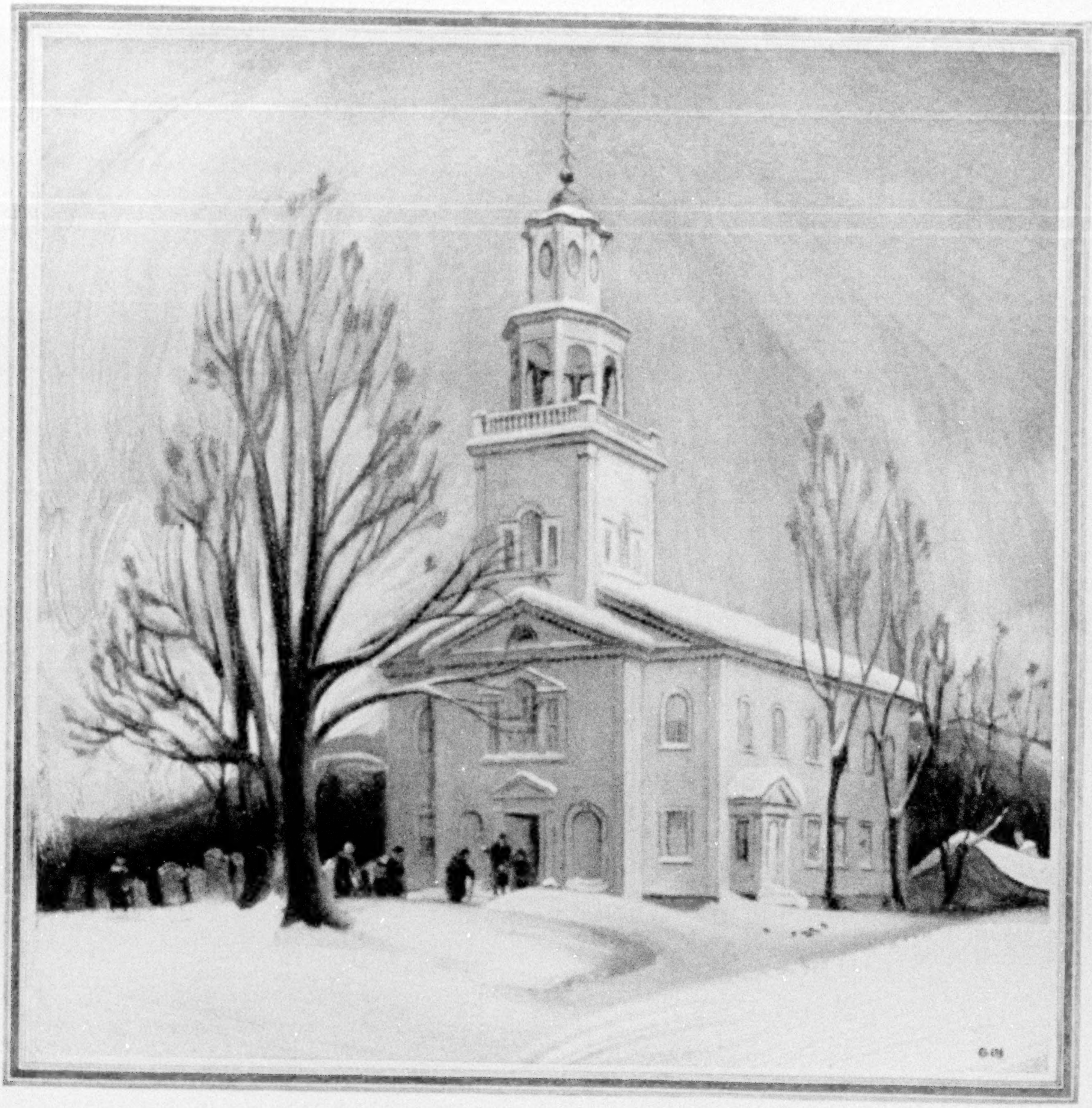


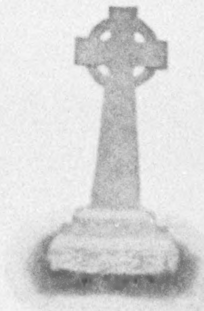
*First Congregational Church — Bennington, Vt.*
*Dedicated in 1806.*

*This is the second of a series of historic New England churches painted by Glen Mitchell.*

*The memorial you place on the grave of those you love is the outward sign of that which is in your heart. Let it be fitting.*

*Our Certificate of Perfection, when requested from any memorial dealer, assures you of our personal inspection through the various stages of completion and is your perpetual guarantee against defective workmanship and material.*

*Write for Booklet "G"*



*"Mark Every Grave"*

ROCK OF AGES

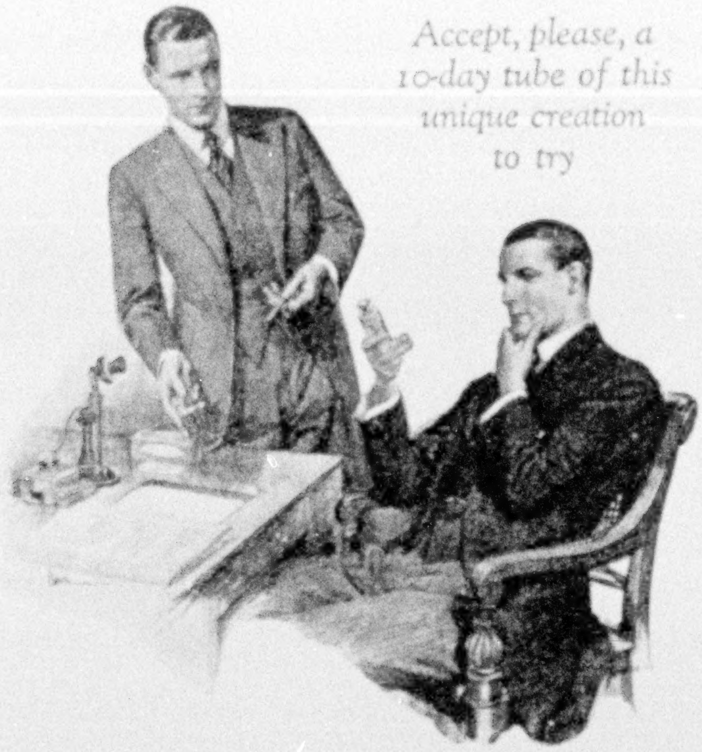
**Rock of Ages**

"The Flawless Barre Granite"

BOUTWELL, MILNE & VARNUM CORPORATION
BARRE, VERMONT

Put Off Buying

Shaving Cream a Few Days



*Accept, please, a 10-day tube of this unique creation to try*

GENTLEMEN: The last few years have brought many new comforts into people's lives. Palmolive Shaving Cream is one.

We asked 1,000 men to name their ideal in a shaving soap. They named four, and we added the fifth that they had forgotten.

We were qualified to meet those desires as you know. This laboratory is 60 years old. It has created, among other things, Palmolive Soap, the world's leading toilet soap.

We made and discarded 130 formulas before reaching our marked goal. But when we did, we had an amazing creation from what men told us.

*5 new joys*

1. Multiplies itself in lather 250 times.
2. Softens the beard in one minute.
3. Maintains its creamy fullness for 10 minutes on the face.
4. Strong bubbles hold the hairs erect for cutting.
5. Fine after-effects due to palm and olive oil content.

*This courtesy, please*

Now, in courtesy to us, will you not accept a trial of Palmolive Shaving Cream? It may be what you want, or it may not. You alone can tell. Send the coupon. We'll rest our case on what you find.

THE PALMOLIVE COMPANY (Del. Corp.), CHICAGO, ILL.

- 10 SHAVES FREE -

and a can of Palmolive After Shaving Talc

Simply insert your name and address and mail to Dept. B-1154, The Palmolive Company (Del. Corp.), 3702 Iron St., Chicago, Ill.

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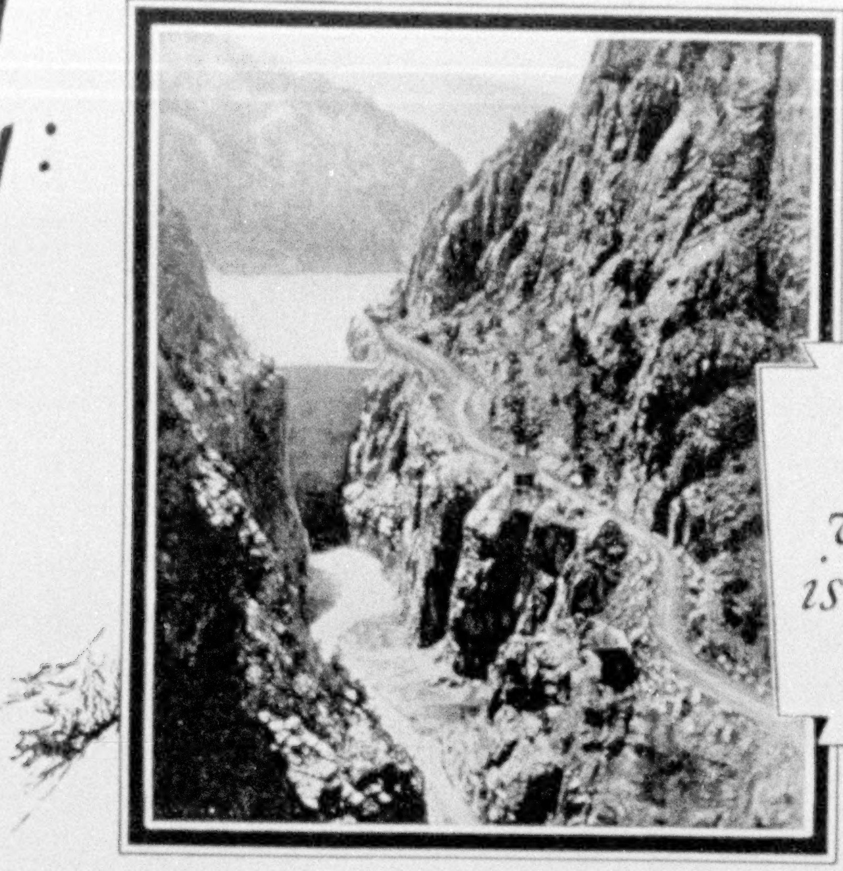

**2**
*weeks*
*is ample*
*time*

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The thrilling 90-mile motor ride over this famous mountain highway is included in your Burlington trip to Yellowstone Park—*without extra cost!*

Simply plan your trip this way: *in Gardiner Gateway—out The Cody Road,* or vice versa. The Cody Road is a tremendous climax to Yellowstone or a fitting introduction—whichever way you go. Thousands say it is the greatest thrill of a Yellowstone tour.

Your Burlington Yellowstone trip also takes you to scenic Colorado—a 700-mile ride down the East Slope of the Rockies, *without extra cost.* A free side trip to Colorado Springs also.

Or you may visit wonderful Glacier National Park for only a slight additional cost.

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NATIONAL PARK

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Please send me your free illustrated book describing Yellowstone Park.

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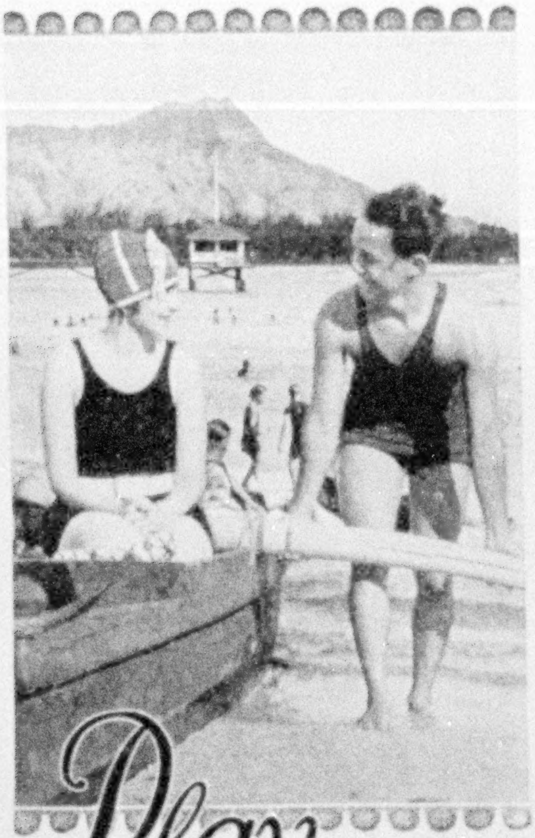
☐ Mark an "X" here if you wish Escorted Tours book.



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Murmur of rippling waves in your ears as you wake. Cool breeze stirring palms outside your window. Golden dawn on clouds and flashing sea. A new day—in Hawaii—and *you* keen for adventure.

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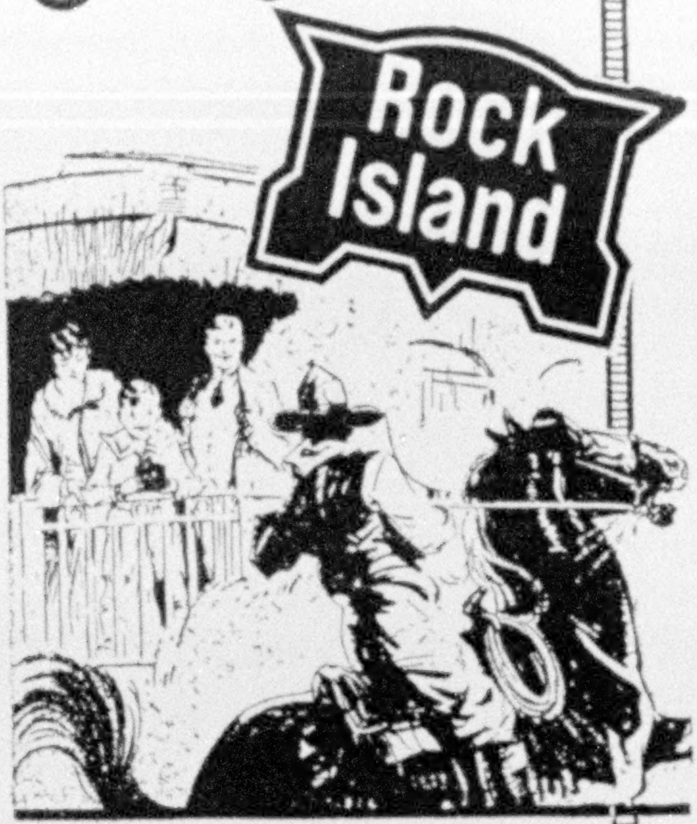

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YOUR memories are investments for a lifetime. Make this a memorable summer. Get the magic of the mountains from the peaks and canyons of the Colorado Rockies. Bear away mental pictures of Yellowstone's weird region of geysers, boiling springs and friendly wild animals. Store away impressions of California's eternal spring, its palms, old missions and giant trees, the Golden strand of the whole Pacific Coast. Stop at El Paso for a day—visit Old Mexico.

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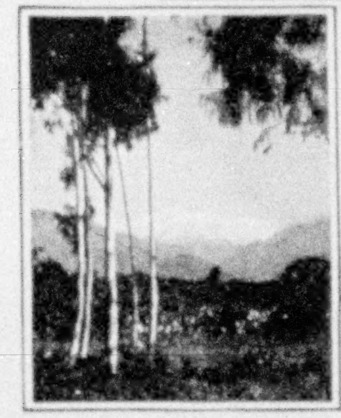

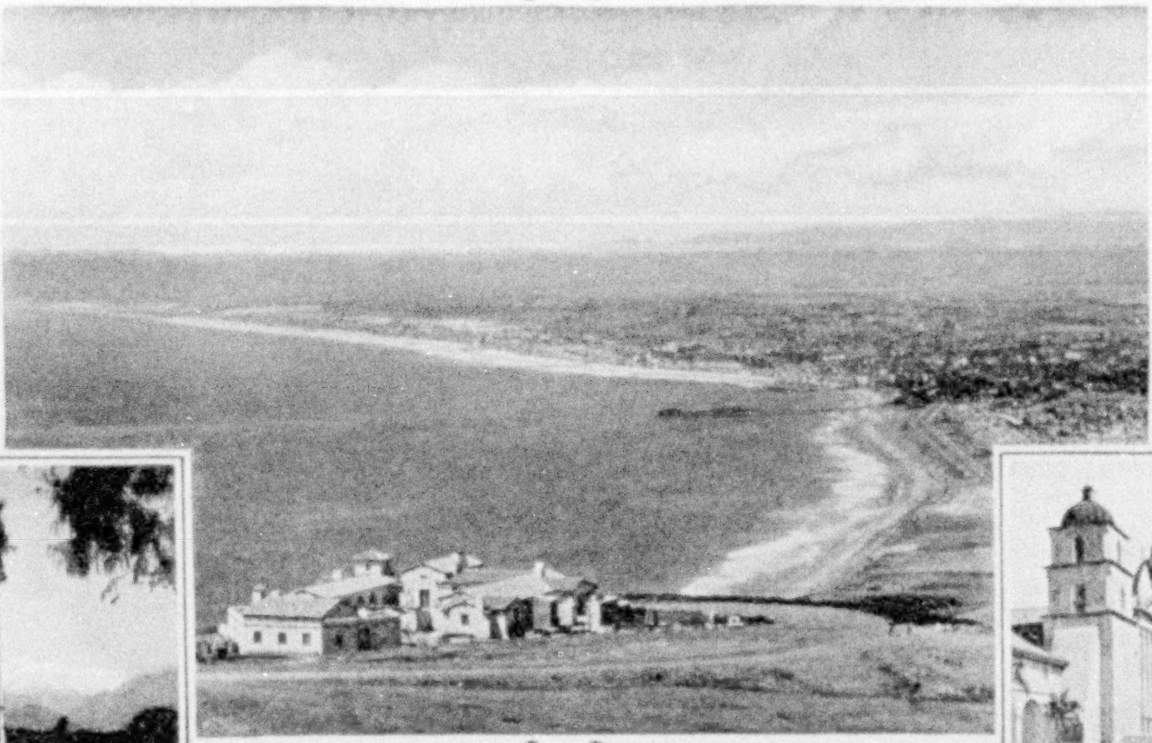

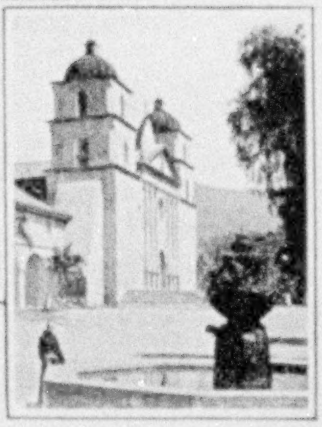

## June Plans—Make Them Now

# *For Your Finest Summer*

We offer you a different experience in an enchanting land where every sport is at its best and gorgeous scenery lends a special charm.

JUST to follow the 5,000 miles of paved motor highways that take you through this country—just to see the valleys, canyons and the mountains—just to get these *views,* would be worth your while.

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Yes, in *Southern California*—and they are U. S. Government Weather Bureau records, not subject to enthusiastic prejudice!

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The city of Los Angeles, with a population of well over a million, is the largest city on the Pacific Coast and is the hub of one of the country's richest agricultural communities.

The growth, wealth and marvelous resources of Southern California are indicated by the following facts and figures pertaining to the County of Los Angeles alone:

| | |
|---|---|
| Value of Agricultural and Live-stock Products (1925) | $84,134,744 |
| Value of Citrus Products (1925) | 23,241,503 |
| Oil Production (1925) | 150,000,000 bbls. |
| Harbor Imports (1924-25) | 4,136,799 tons |
| Harbor Exports (1924-25) | 18,131,622 tons |
| Total Harbor Tonnage | 22,268,421 |

A producing season of 365 days a year permitting year 'round crops.

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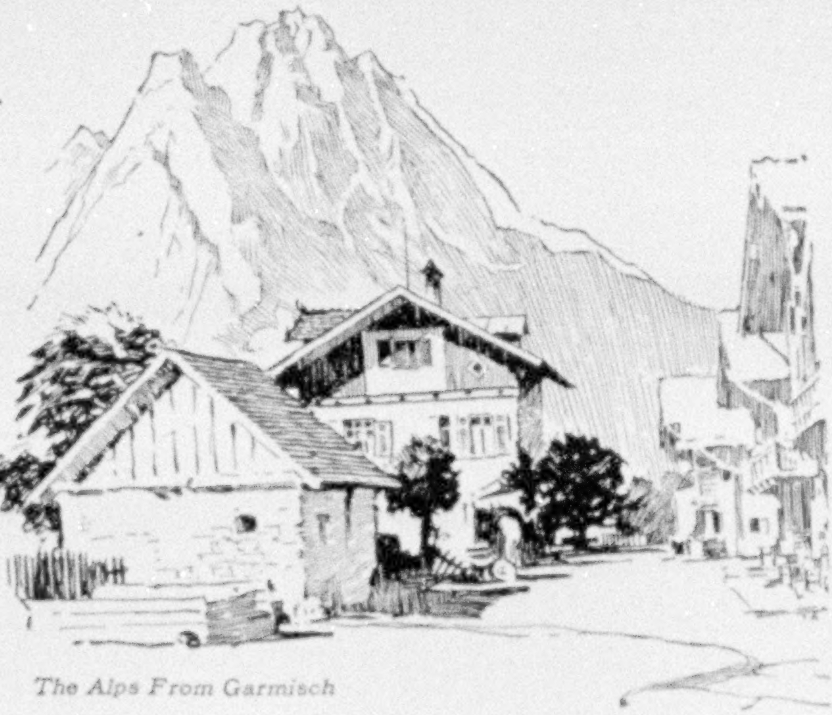

*The Alps From Garmisch*

To help you visualize picturesque Germany, we will be pleased to send illustrated booklets of artistic merit. Nothing sold—gratis information on European travel, places of interest, fares, distances, time tables, health resorts, hotels, rates, etc.

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**to cool, scenic regions of the Far West ▾ ▾ ▾**
**California, Colorado, New Mexico - Arizona Rockies and the National Parks ▾**

On your way to California or Grand Canyon National Park, take the Indian-detour, a three days motor trip through oldest America. Only $45 extra, everything included—meals, lodging, motor transportation. Santa Fe-Fred Harvey management. Ask for special folder.

Santa Fe

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Would like information regarding summer trip to..........................................

There will be..........................................persons in party. ☐ Indicate by X if Grade or High School student. Also mail descriptive travel folders.

Name..........................................

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In the tent of a Bedouin on the sands of Sahara, or over the counter of the Ritz in London—

As your fare on a junk in Hongkong Harbor, or on an American Pullman—

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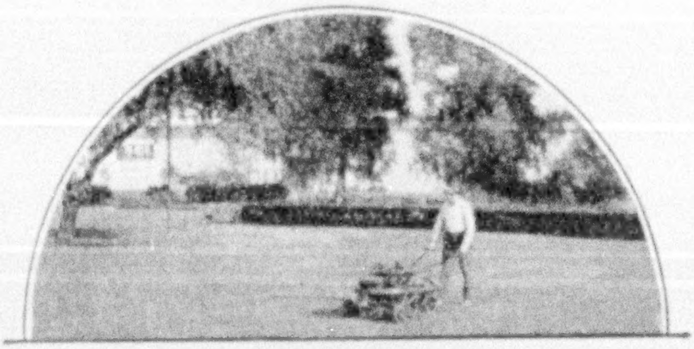

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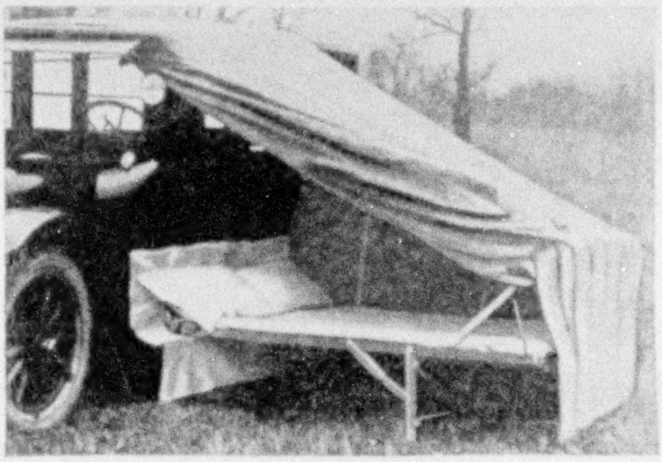

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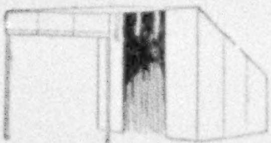
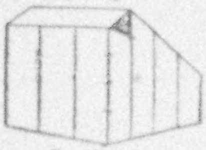


By Day



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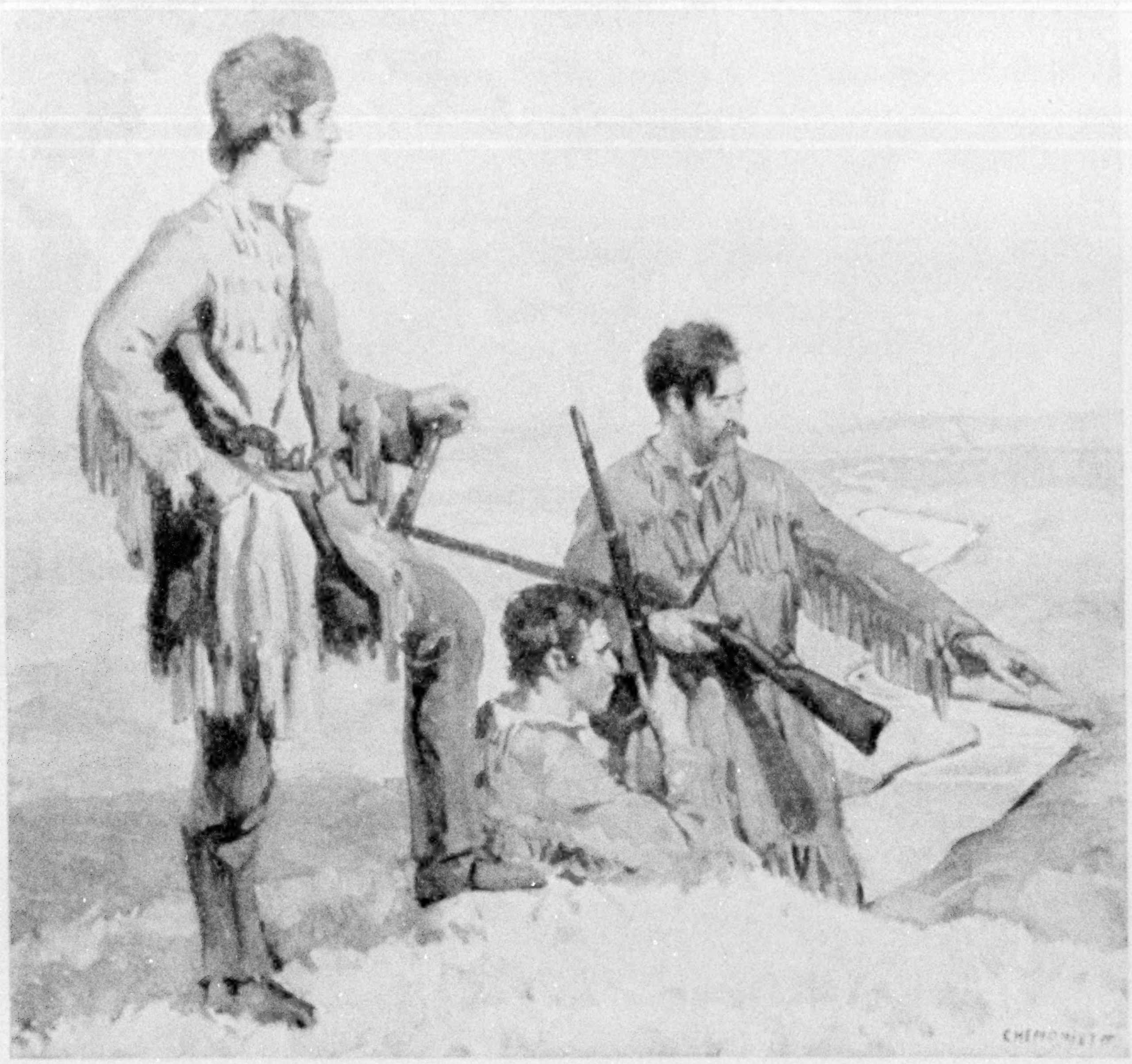

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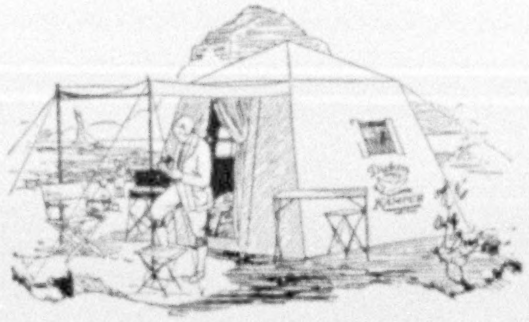

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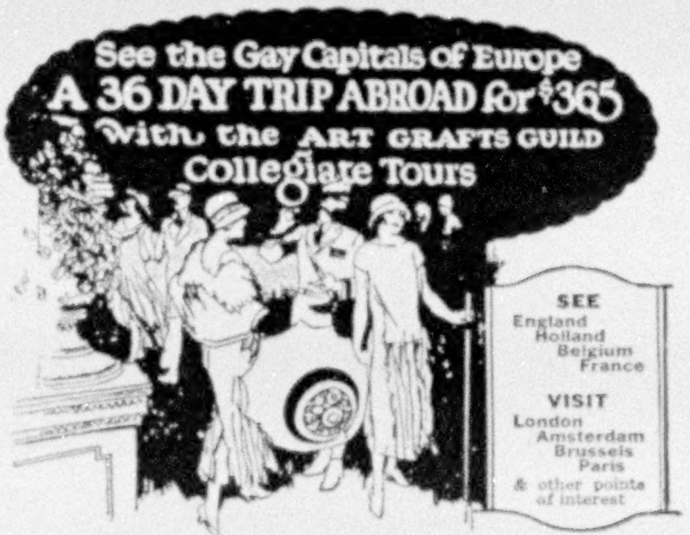
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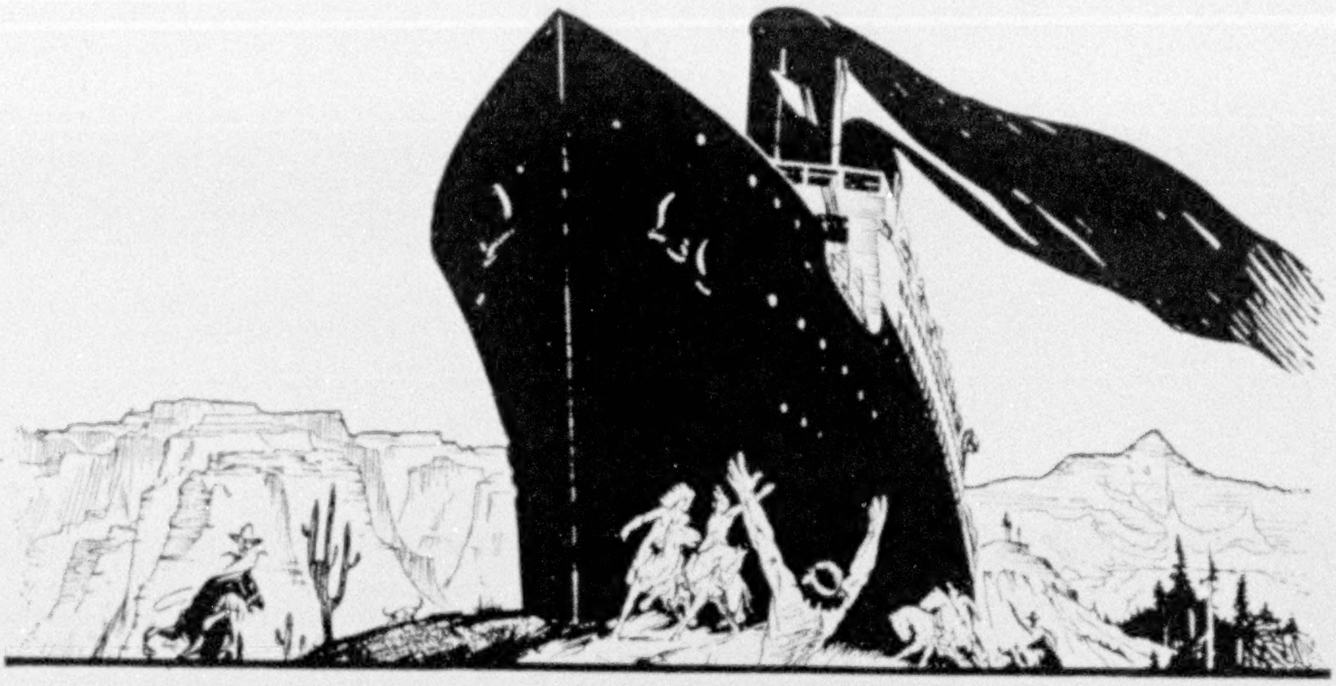

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| | |
|---|---|
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| Pacific Northwest Land Cruises<br>*June 30 & July 28 — 24 days* | Yellowstone Land Cruises<br>*July 24 & August 23 — 15 days* |

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*Executive Offices:* 26 Beacon Street, Boston

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This unusual tour comprises visits to old Santa Fé, and to several Indian pueblos, as well as the huge ruin of Puyé a cliff pueblo twenty centuries old.

There will be optional side trips and "land cruises" in charge of specially trained couriers for those who wish to extend their travels off-the-beaten-path.

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Santa Fe
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Am planning a trip to..............................
this summer and would be glad to receive detailed information about the Indian-detour.

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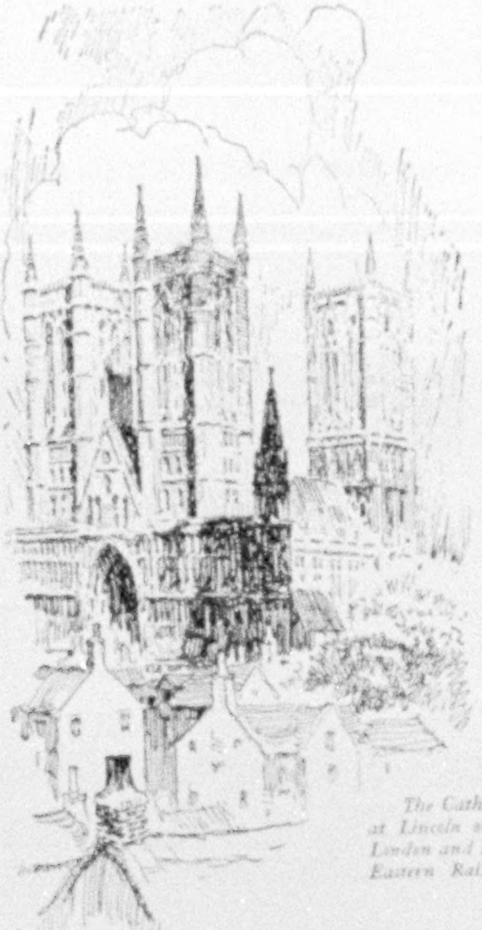

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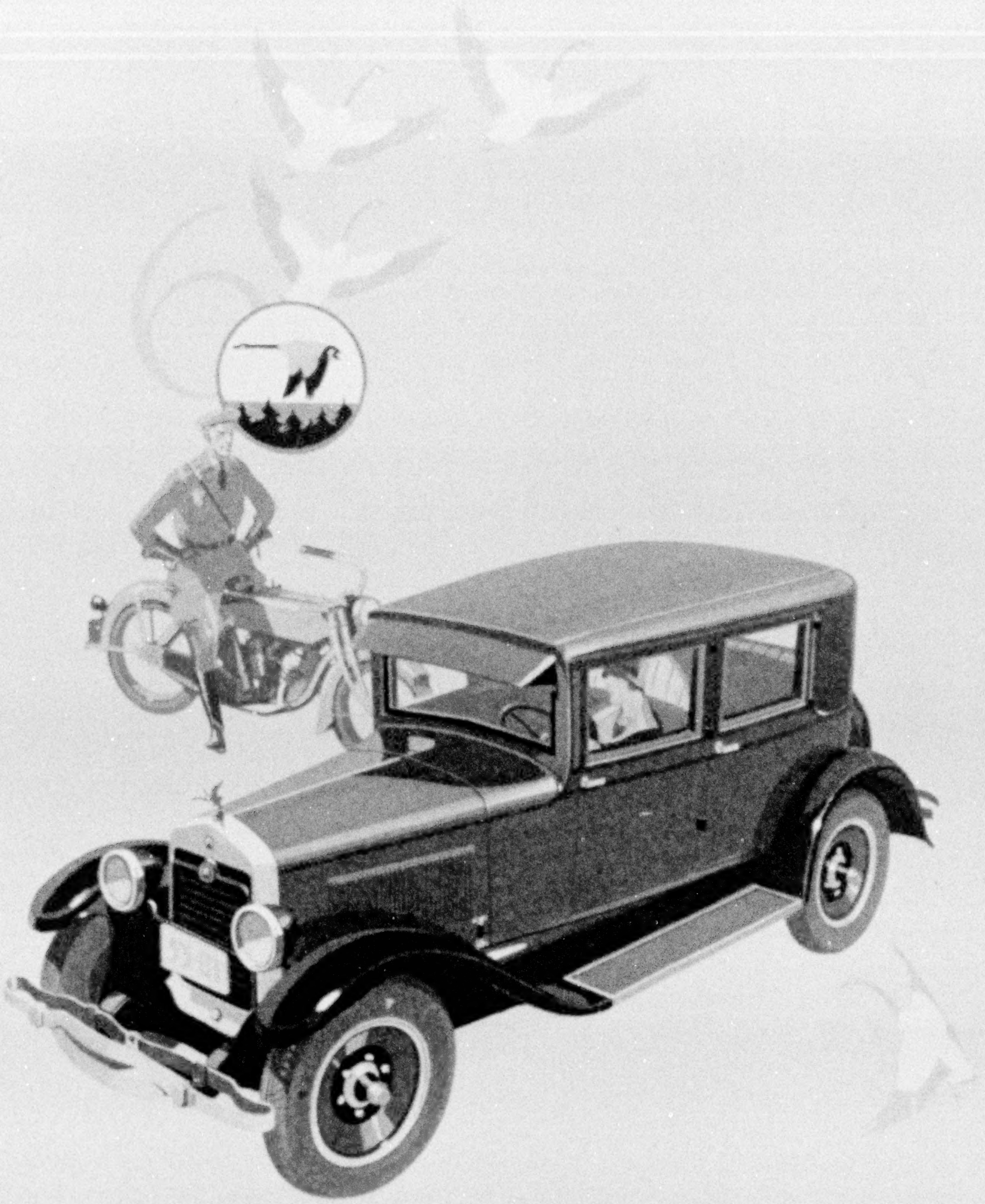
RAILWAY

*OF ENGLAND AND SCOTLAND*



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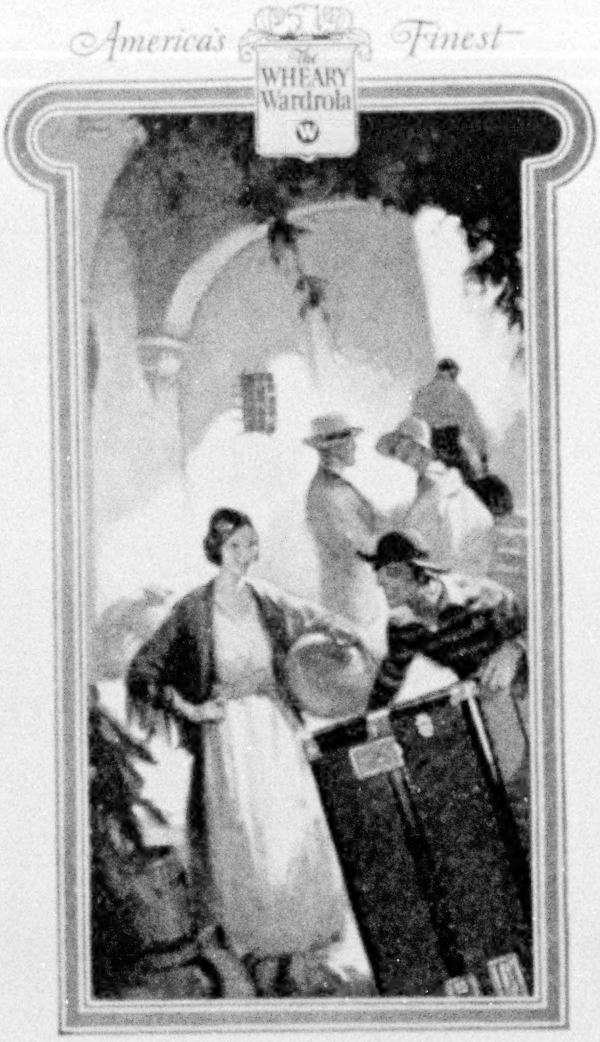

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*Cushioned Top*

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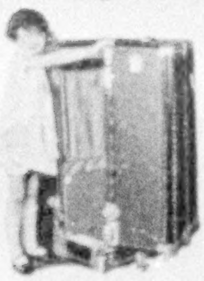
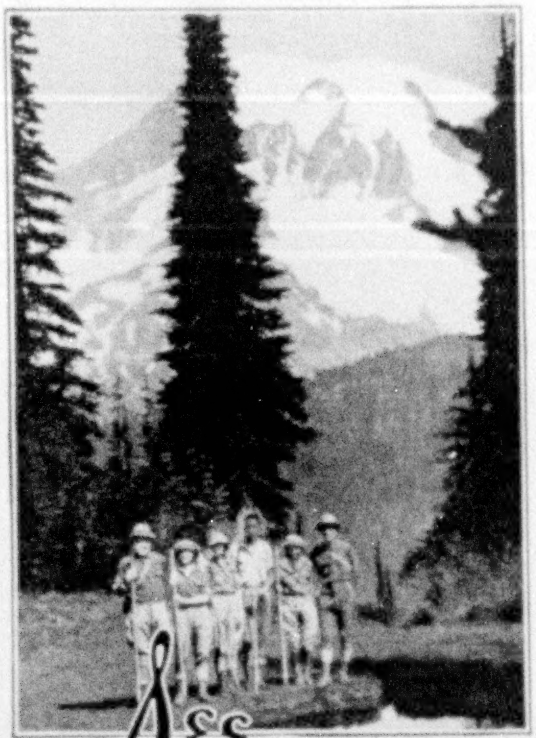


THE TRUNK
THAT *Rolls*
OPEN



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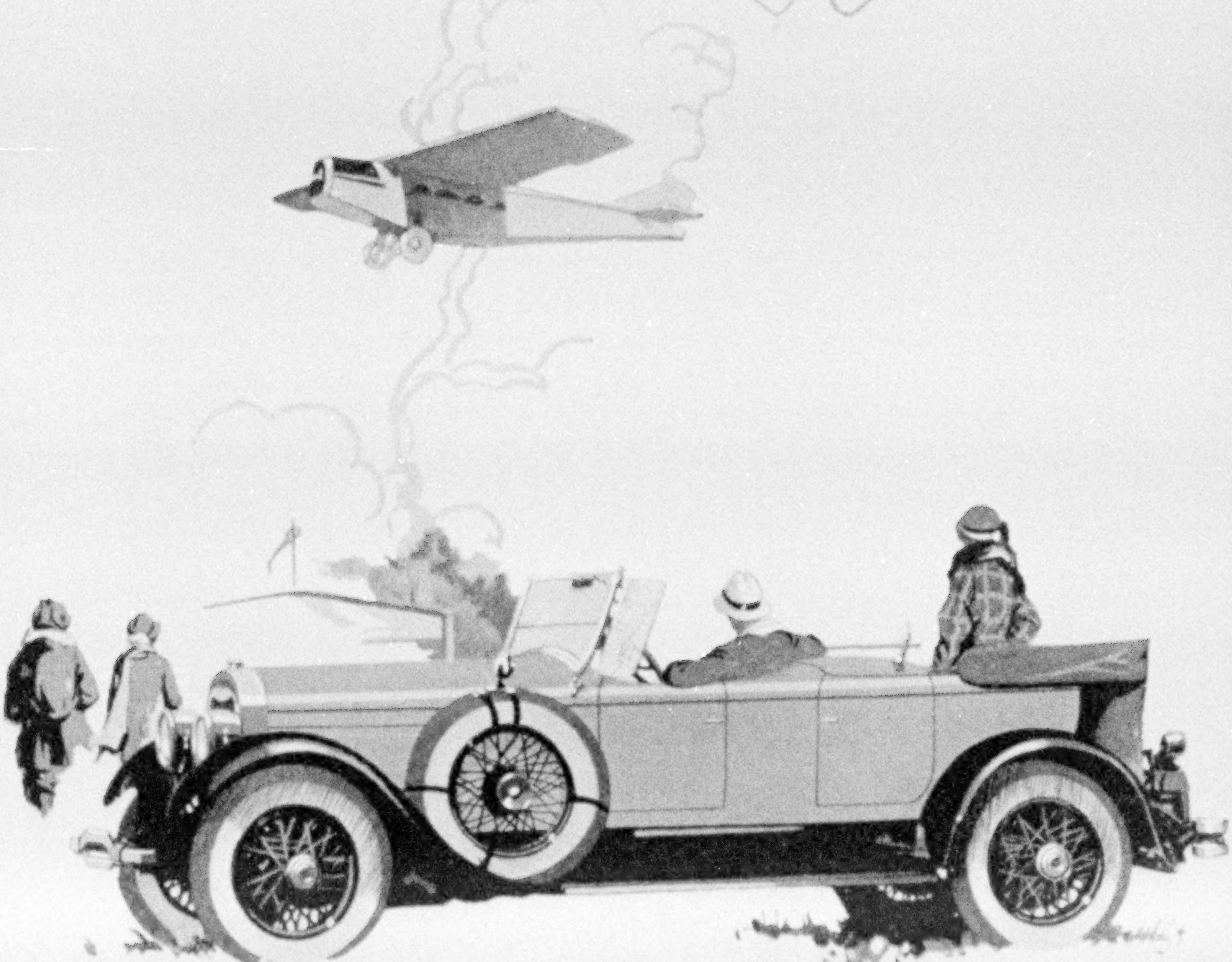

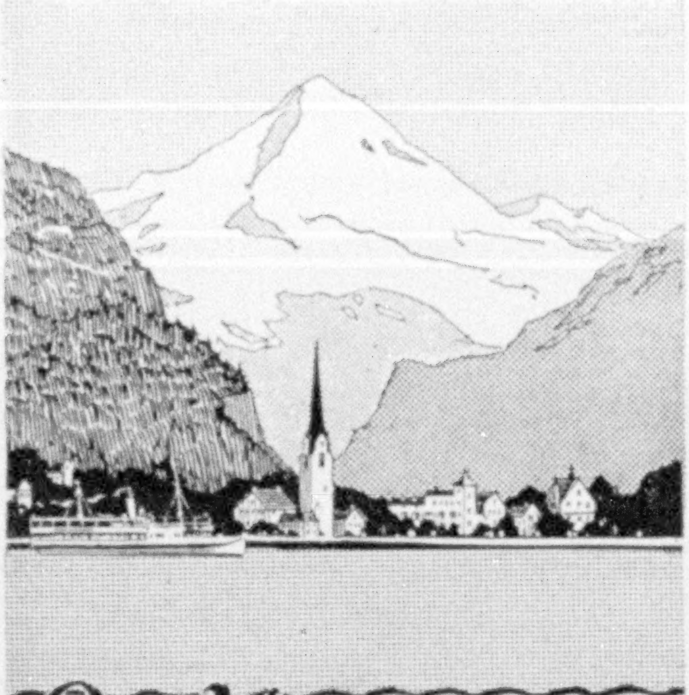

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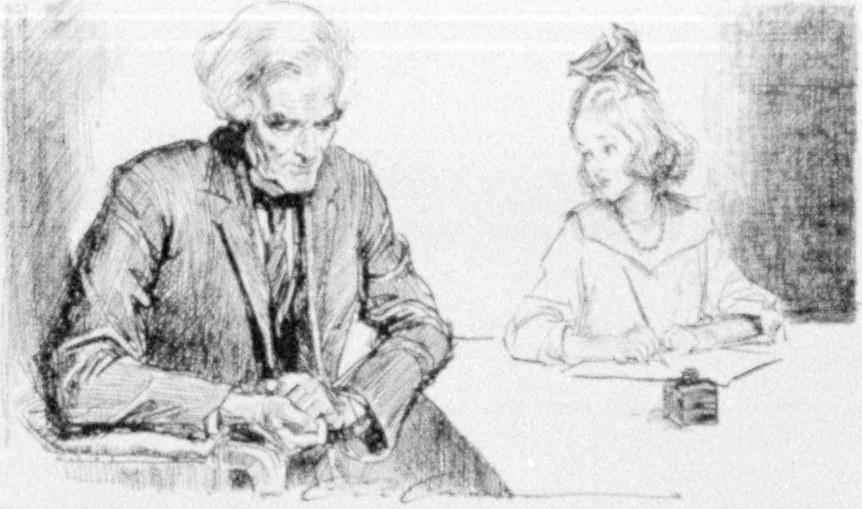

"Your daddy won't listen to me. But he will do anything for you. If you will send for the book that tells what the big doctors have found out he will read it. Let's write for it now."

ASK a dozen persons about insulin and you will get some surprising and contradictory answers. The truth is this: Insulin is not a cure for diabetes, but it is helping to prolong and gladden lives. Before its discovery diabetes in a child meant almost certain and early death.

Men and women usually have a milder form of diabetes than children. In many adult cases it is possible, through diet alone, to keep the disease under control.

Physicians advise that insulin be used immediately in severe cases, or before surgical operations upon a diabetic, or where the amount of physical work done by the diabetic makes a more liberal diet necessary for comfort.

So new is insulin that it is not safe to make sweeping promises of what it will do, although it has been known to bring men, women and children back from the very brink of death. Because insulin is so powerful it should be used cautiously and only under the direction of the best physician obtainable.

It is estimated that there are one million persons in the United States who have diabetes. No time should be lost in providing insulin treatments for those who need them. Happily, the cost is not prohibitive.

In normal health the body makes its own insulin. It is a secretion of the pancreas. Insulin enables the body to use the sugars and starches (carbohydrates) that we eat. When, through disease of the pancreas, the body is no longer able to create its own insulin, diabetes follows. The body cannot then utilize sugars and starches. The first thing to do is to curtail the amount of carbohydrates in the diet and, when necessary, use insulin derived from outside sources.

Diabetes may be caused by an infection of the pancreas as the result of disease in some part of the body; it may be that overeating or some other cause has brought it about. But too much food and too little physical exertion are said to be the main factors in producing diabetes.

Occasionally a patient, under insulin treatment, feels so much better that he is tempted to abandon his diet and eat everything he wants. But when he does he is likely to suffer a relapse and die. Then insulin is blamed. Insulin does not take the place of diet, but carefully supervised diet, plus insulin, is enabling diabetics to live useful lives in comparative comfort.

THE LIGHT THAT NEVER FAILS

During the past 25 years diabetes has become such a menace that physicians and scientists have worked unceasingly to fight its advance.

Diabetes is a disease which attacks all ages. It is important to note that in diabetes, as in many other diseases, the age of 30 is, broadly speaking, the dividing line. Overweight, over 30, predisposes to diabetes, and young underweights seem to be more susceptible to this disease.

The Metropolitan Life Insurance Company will gladly send you a booklet, "Diabetes" which tells the intensely interesting life-saving story of insulin.

HALEY FISKE, *President.*

*Published by*

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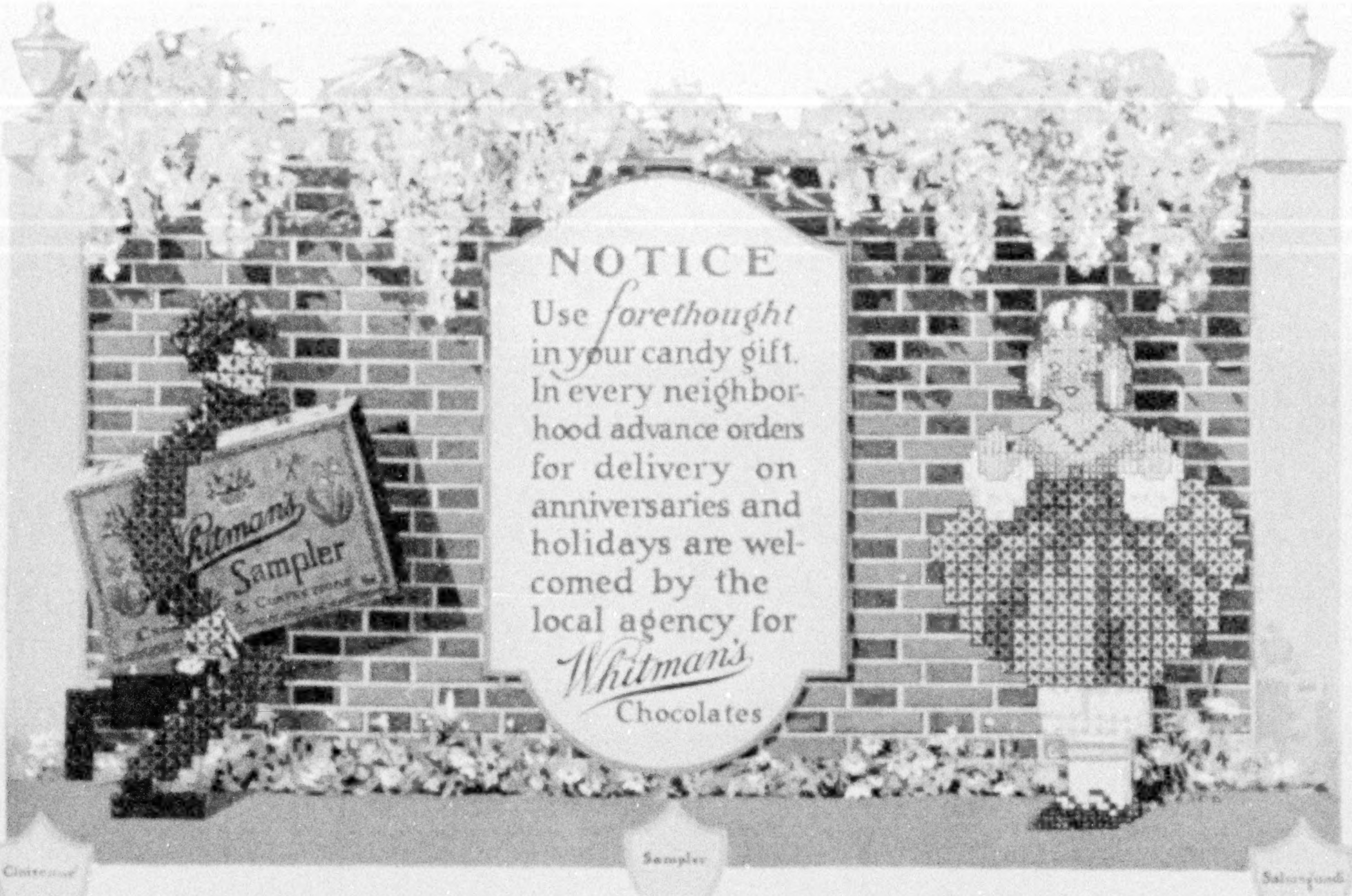

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Use *forethought*
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In every neighborhood advance orders
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anniversaries and
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These are *selected* stores, one in nearly every neighborhood in the land. They are drug stores, mainly, because the "drug" store today is the outstanding public servant among retail stores, a popular store by day or night.

Last year these progressive stores were able to serve thousands of people better by taking their orders in advance of holidays and anniversaries. At the proper time they sent the candy containing the customer's card and greeting. It is human nature to remember—and then forget. Our agencies did the remembering.

Let the local Whitman agent have your order when you think of it—for the Mother's Day remembrance, the *bon voyage* package, for the birthday or wedding anniversary. Then though you forget it, your remembrance will be on hand at the proper time.

Whether you buy Whitman's in a large city or a remote village the dealer is a selected agent, with an interest in maintaining our reputation for quality and service. The candy is sent him *direct from Whitman's*, not through a jobber or middleman. Every package he sells you must give complete satisfaction. It is doubly guaranteed, by the agent and by Whitman's.

STEPHEN F. WHITMAN & SON, Inc., Philadelphia

New York Chicago San Francisco

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# EXPLORING THE VALLEY OF THE AMAZON IN A HYDROPLANE

## Twelve Thousand Miles of Flying Over the World's Greatest River and Greatest Forest to Chart the Unknown Parima River from the Sky

By Captain Albert W. Stevens, U. S. Army Air Service

*With Illustrations from Photographs by the Author*

MAN'S conquest over Nature was never more forcefully asserted than when members of the Alexander Hamilton Rice Scientific Expedition recently flew to the headwaters of the Parima River, in northwestern Brazil.

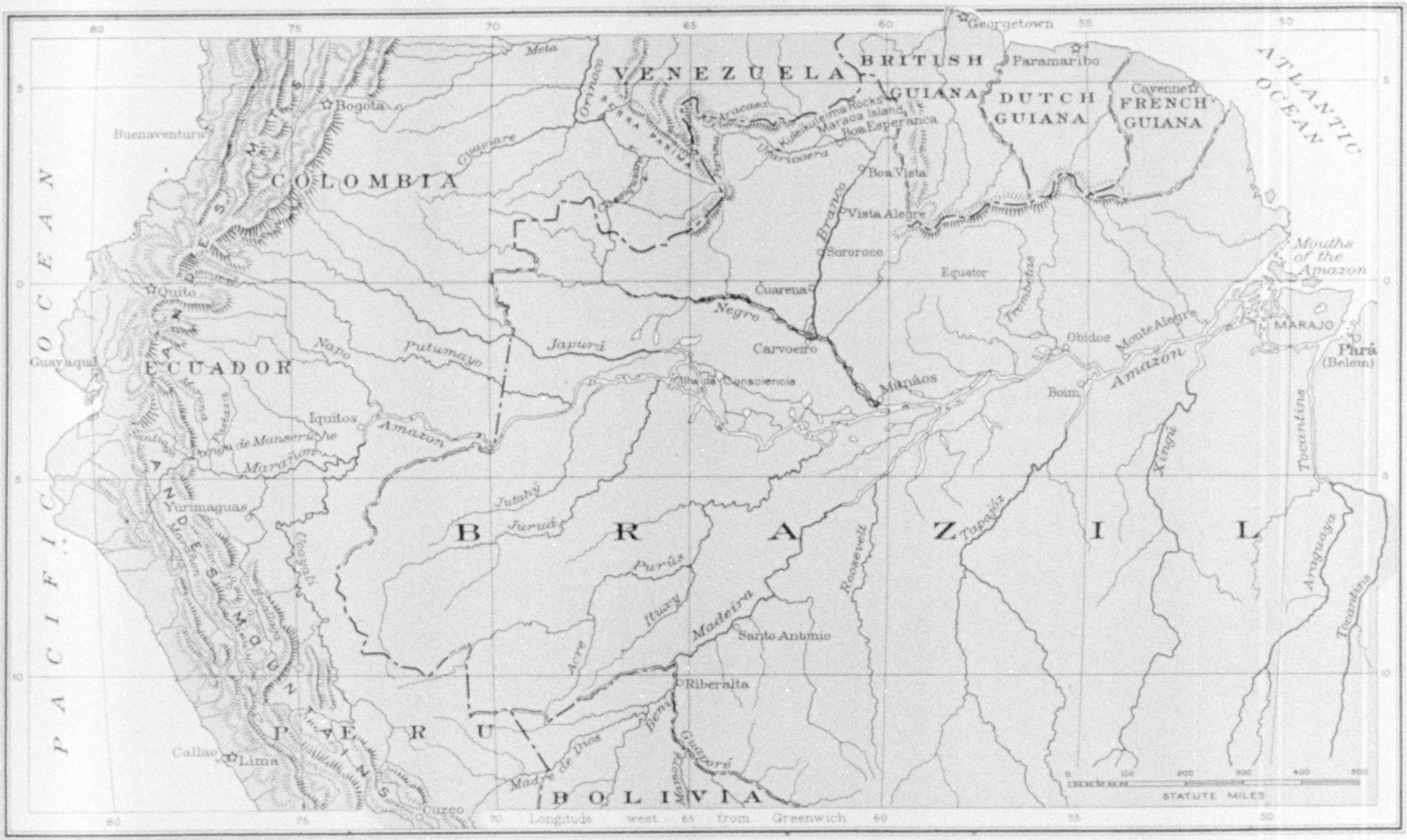
The upper Amazon Basin is one of the last of the world's blind spots to succumb to the persevering curiosity of the explorer. For many years attempts had been made in vain to penetrate the dense jungles which cover it, and to navigate the seething rapids that block its rivers, but the undertaking has now been proved entirely feasible from the air.

Where the untrodden jungle presented a matted and almost impenetrable wall to men on foot, it surrendered its secrets readily to men in the sky. The hostile Indians who had hindered previous expeditions could not obstruct a plane flying 3,000 feet above them, and no ground scout, however skillful, could match an aviator in ferreting out the easiest trails to be followed and forewarning of obstacles to be met and overcome. Our hydroplane served as the eyes of the expedition.

Our party assembled in Manáos, Brazil, on July 6, 1924, and consisted of Dr. Rice, director; Dr. Koch-Grünberg, ethnologist; Dr. George Shattuck, physician; Weld Arnold, cartographer; Charles C. Bull, assistant; John C. Couzens, engineer; Walter Hinton, airplane pilot; John E. Wilshusen, airplane mechanic; John W. Swanson and Thomas S. MacCaleb, radio-telegraphists; Hermann Dengler, draftsman; Silvino Santos, film operator; Ramundo Camara, assistant; and myself, as observer and aërial photographer. With the Indian porters and paddlers, our party numbered more than 100.

The variety of professions represented on its staff suggests the variety of the objectives of the expedition. Dr. Rice set the following program:

To survey and map the Rio Branco and its western affluent, the Rio Uraricoera, following the latter to its source in the Serra Parima, and to ascertain whether any passage existed between the headwaters of this river and those of the Orinoco, thus tying this survey to the one carried out on the leader's 1919-20 expedition.


ATLANTIC OCEAN
PACIFIC OCEAN
VENEZUELA
BRITISH GUIANA
DUTCH GUIANA
FRENCH GUIANA
COLOMBIA
ECUADOR
PERU
BOLIVIA
BRAZIL
ANDES MOUNTAINS
SERRA PARIMA
Georgetown
Paramaribo
Cayenne
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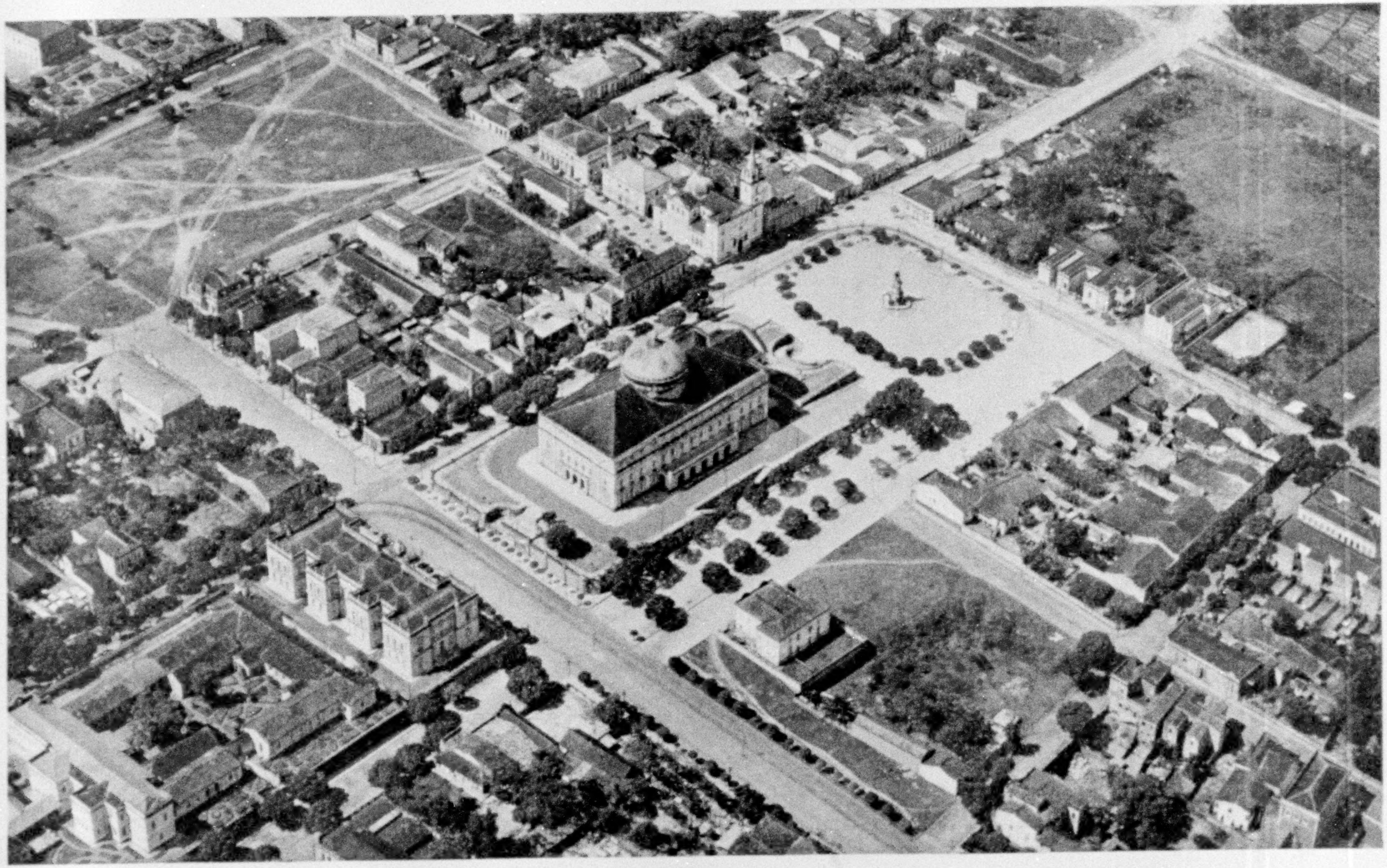
Quito
Guayaquil
Iquitos
Yurimaguas
Callao
Lima
Cuzco
Orinoco
Meta
Guaviare
Aracasa
Kulekuleima Rocks
Maraca Island
Boa Esperanca
Uraricoera
Boa Vista
Vista Alegre
Branco
Sororoco
Cuarena
Negro
Carvoeiro
Manáos
Equator
Trombetas
Obidos
Monte Alegre
Boim
Amazon
Mouths of the Amazon
MARAJO
Pará (Belem)
Tocantins
Araguaya
Xingu
Tapajoz
Roosevelt
Madeira
Santo Antonio
Riberalta
Guaporé
Mamoré
Beni
Madre de Dios
Acre
Ituxy
Purûs
Juruá
Jutahy
Japurá
Putumayo
Napo
Alto da Consciencia
Marañon
Pongo de Manseriche
Santiago
Morona
Pastaza
Ucayali
Huallaga
Longitude west from Greenwich
STATUTE MILES
0 100 200 300 400 500
80 75 70 65 60 55 50
5 0 5 10

Drawn by A. H. Bumstead

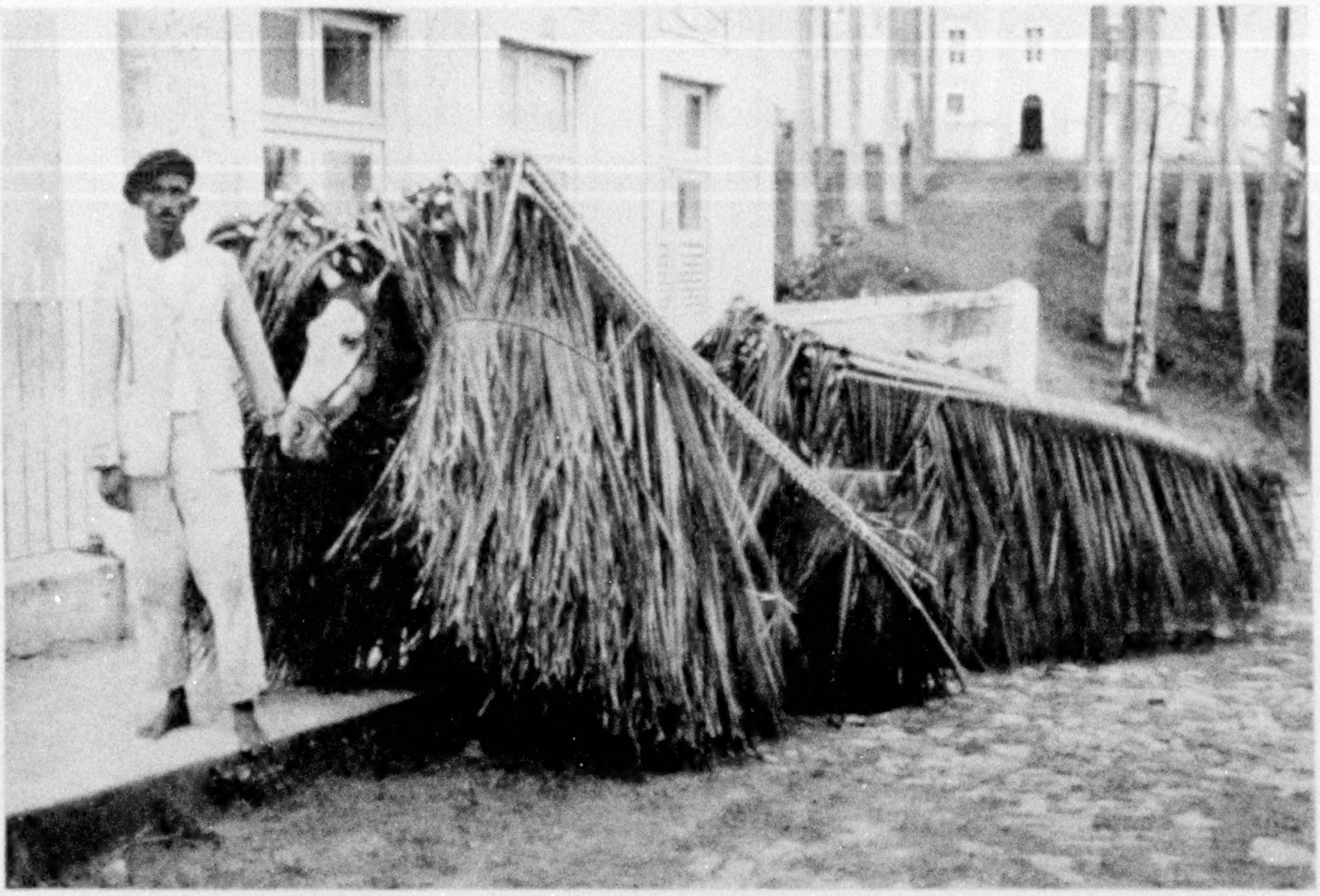
THE BASIN OF THE AMAZON, THE WORLD'S GREATEST RIVER

The Rice Expedition began its exploration of the Amazon Valley by hydroplane at Manáos. The route followed was: Up the Negro to Carvoeiro, thence up the Branco to Boa Vista, then to Boa Esperança on the Uraricoera. The party continued along this roaring river to the confluence of the Parima and the Aracasa, and up the former to its source in the Serra Parima (see pages 353 to 420). For an account of the wild life and vegetation of the Amazon Basin, see pages 444-463.

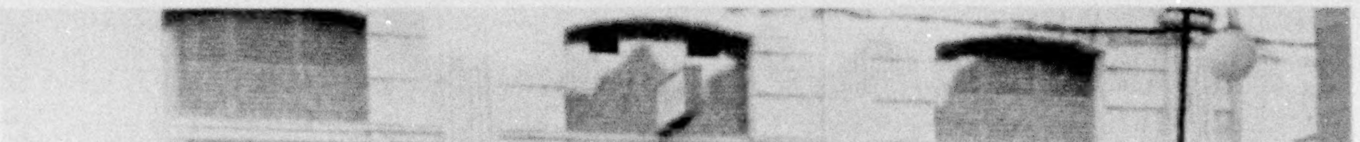


THE OPERA HOUSE IN MANÁOS

This city is located in the midst of the world's greatest forest, nearly 1,000 miles from the mouth of the Amazon. Its electric cars are owned and operated by an English company. To the upper right is a square paved in mosaic stone. The Opera House, with its gilded dome, was erected during the rubber boom, a decade ago.

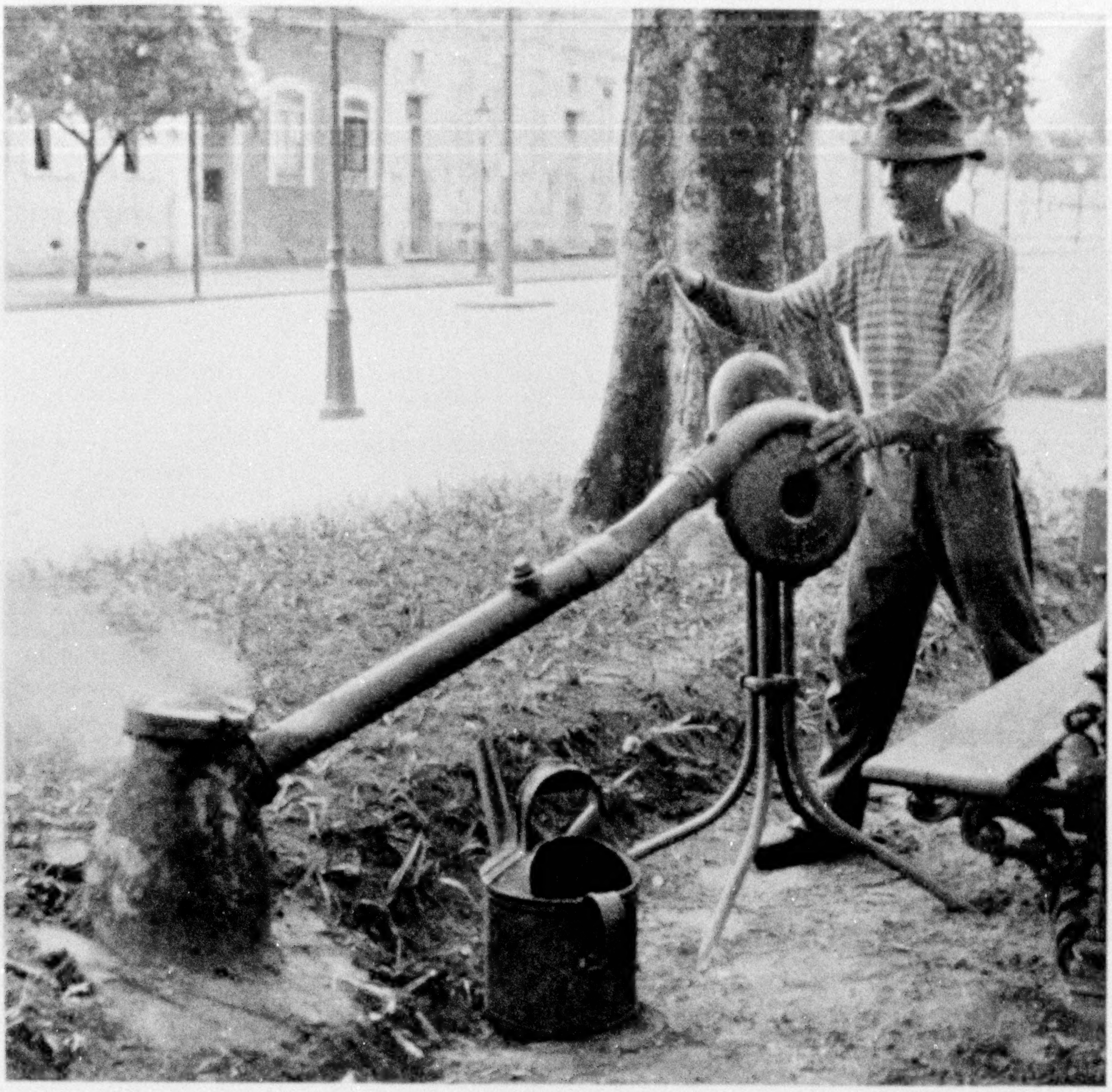


BRINGING IN A LOAD OF PALM BRANCHES: MANÁOS



AMERICAN MOVIES ARE POPULAR IN MANÁOS

The posters are in English, with the Portuguese translation of the title above.



KILLING ANTS WHOLESALE IN A BRAZILIAN CITY

Fumes of burning sulphur and other chemicals are forced into an ant hill and throuth its honeycomb passages underground, by means of a hand-manipulated blower. Hundreds of feet away fumes may be seen coming through holes in the ground, other entrances to the same hill.

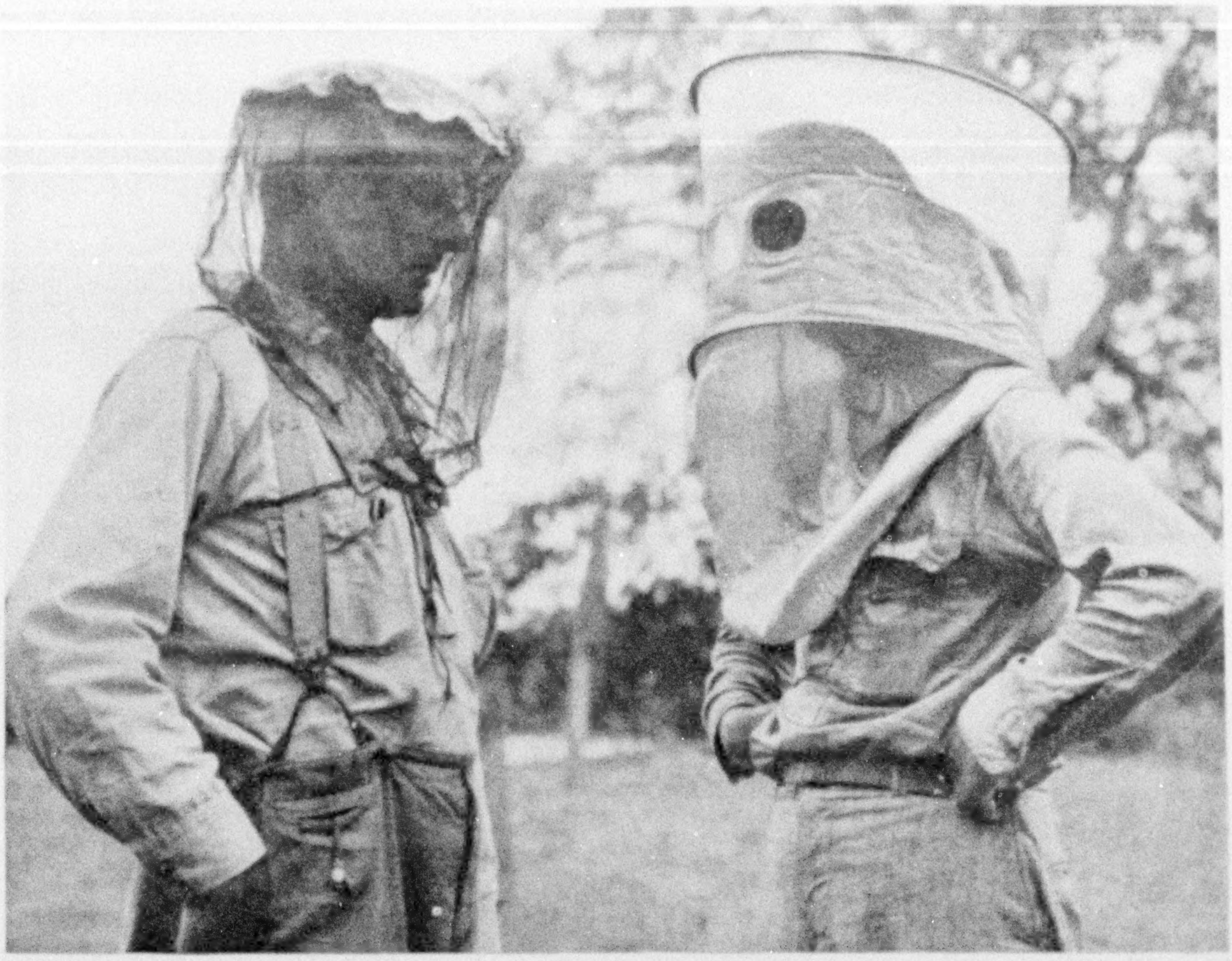
We also proposed to test the usefulness of a hydroplane in survey work, especially in regard to map sketching, traversing and aërial photography, scout maneuvers and reconnaissances, and in effecting communication between the various units of the party that might be temporarily separated.

We were, further, to try out a more expeditious and accurate way of making astronomical determinations by means of theodolites equipped with prisms; to experiment and test specially designed radio apparatus; to study the geology of the region; to gather anthropological and ethnological data; to make a medical survey.

Our expedition started off with a bang—with several bangs. On the night following our arrival at Manáos a revolution broke out.

The city looked peaceful enough at the time and most of our party had gathered for dinner in the lobby of the Grand Hotel, when a troop of soldiers marched by, carrying rifles and dragging some light fieldpieces and machine guns. We thought twilight a queer time for a parade, but, after all, it was their country.

It was not given us to dine without interruption that night, however. During the first course a regular Fourth of July celebration broke loose outside. Fright-



VEILS WORN FOR COMFORT, NOT STYLE

Charles Bull (at the left) wears an American mosquito net, while Walter Hinton (on the right) masquerades under an English type of protector against winged insects. The American style of mosquito armor, less bulky, providing better ventilation, and affording the wearer better vision, was used by a majority of the members of the expedition. While paddling and flying, a net is not necessary.

ened hotel attendants slammed doors, banged down windows, and pulled the shades.

The unmistakable spatter and whistle of bullets in the near-by main street made it plain that the explosions were not harmless firecrackers. We were at the ringside of a full-fledged revolution! A hotel employee rushed to close the window by our table. We waved him away. Wild gesticulation and a flood of unintelligible Portuguese had no effect on our determination. For most of us this was our first revolution and we had no intention of missing any of it.

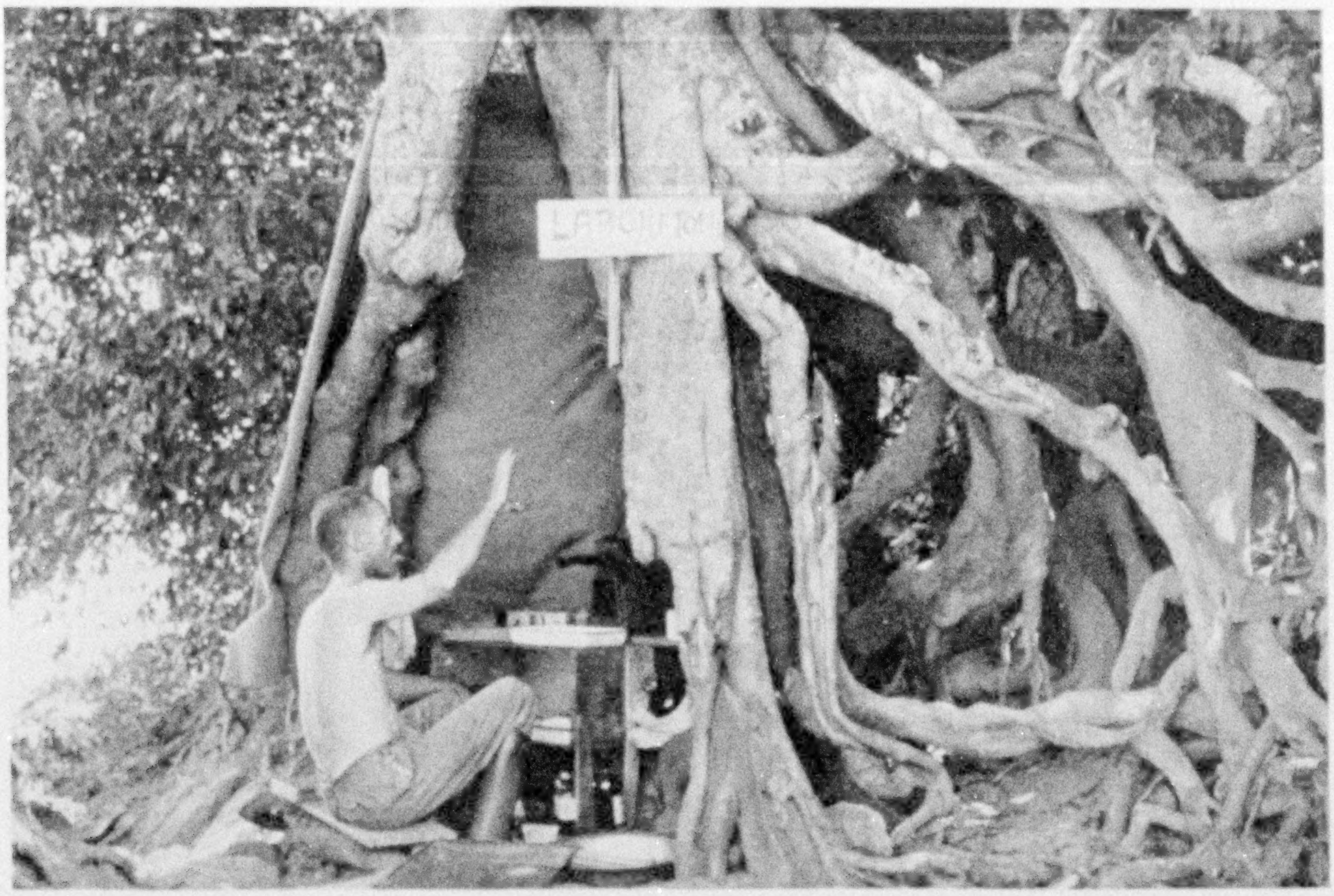
### CABIN MATE STARTED REVOLUTION

Through the window I looked out upon a street as empty as if a cholera epidemic had decimated the town. Everybody had shut up shop and pulled the curtains. Our hotel was just off the avenue which was being swept with intermittent squalls of musketry and machine-gun fire. Now and then a bullet would carom off a wall into our street.

While we debated whether or not to resume dinner, a man came running into the side street at full speed. He zigzagged back and forth, wildly searching for a place of refuge. The yellow light streaming out of our window caught his eye and he made for it.

The window was high, but he threw himself against the wall. He could not reach the sill. Bull and I leaned out, the scared Brazilian gave a big jump, and we caught him by the wrists and pulled him to safety. He collapsed on the floor, his teeth chattering audibly.

I am now convinced, and so are the rest of our party, that my cabin mate on the way up from Rio de Janeiro set off this revolution. At every port this Brazilian



A TANGLE OF ROOTS CONVERTED INTO A PHOTOGRAPHER'S DARKROOM

Santos, the motion-picture photographer, discovered this huge tree growing on the river bank, where water was handy. He saw its natural advantages and converted it into his "laboratorio." At night, with a bit of canvas wrapped around the roots to keep out stray light, he would develop strips of film in order that he might test the result of his day's exposures. An enthusiast in his work, he would go about the camp with a lantern or a candle and a foot or two of movie film, showing everyone what luck he had had. If he failed to appear, his associates knew that the day had been a failure.

politician had donned a silk hat, arrayed himself with the scrupulous perfection of a diplomat bound for a state reception, and vanished ashore for the day. And at every port at which we stopped a revolution subsequently broke out. A plague ship could not have spread disease any more thoroughly than our ship spread revolution. But events proved that we were fortunate to have come on that boat, since shipping on the lower Amazon practically ceased for more than two months after the outbreak.

## REVOLUTIONISTS, WITH LATIN FERVOR, EMBRACE A STALWART ENEMY

The fireworks died down later in the evening, so we decided to venture out to look over the field of carnage. The streets were still deserted, but soon we came to a soldier on guard. Could we go on? He assured us we could. A few blocks farther along another guard let us pass into the public square where most of the fighting had occurred. The police barracks facing the square had been riddled by gunfire.

The police had defended Manáos from the unpaid soldiers, but when their barracks fort became too hot all had fled save one—an old police colonel, who held out doggedly against the attackers. His return fire from the barracks finally ceased and the troops closed in.

The old colonel was found inside, down, but not disheartened. In picturesque Portuguese he told his captors that he would still be picking them off if he could, but four bullet wounds through the legs and arms had laid him out.

With true Latin spirit, the besiegers promptly embraced their prisoner, praised him to the skies for his gallant defense, and then packed him off to the hospital to be patched up.

Manáos had changed hands with not more than a dozen casualties.

One morning a few weeks after the

revolution our steamer and hydroplane started up the Rio Negro, and for nine months thereafter we were in, beside, and over the world's greatest forest.

To take advantage of the cool, steady air and good observation conditions, Hinton and I took off in the early morning hours, as a rule, flying about 100 miles up the river, taking photographs and sketching as we went. By nightfall the chartered steamer carrying the rest of the expedition usually arrived at our anchorage.

### THE BLACK MIRROR OF THE RIO NEGRO IS A PERIL TO AVIATORS

The Negro is well named; it is glossy black. When government engineers wanted to make a mirror basin between the Washington Monument and the Lincoln Memorial in Washington, they coated the bottom of the long pool with pitch. When it is smooth the Negro, by its blackness, produces the same sort of mirror.

To a person on a steamer deck the beauty of the tropical scene is heightened by this phenomenon, but to a hydroplane pilot it offers grave danger, because he cannot accurately gauge his distances. Whenever possible Hinton came down in the wake of a boat whose waves broke the mirror.

For 200 miles we followed these waters, from Manáos to Carvoeiro, where, to our great relief, we saw the milky waters of the Rio Branco pouring into the Negro like cream into black coffee (see, p. 380).

At Siroroco, some distance up the Rio Branco, I gratified a desire that was born in the days when I wore knee breeches and the wonders of geography were first being revealed to me. I stood on my own shadow! Siroroco is one degree off the Equator, and we arrived there at the time of the autumn equinox, when the sun was crossing The Line on its swing to the Tropic of Capricorn. At noon, therefore, the sun was directly overhead.

Here we had to make our first repairs. We had begun to suspect that all was not well with the bottom of our plane several days previously, and this fear was confirmed when we flew over the steamboat and Wilshusen noted the "blister" spots which appeared where the hull covering had become loose.

Knowing that trouble was in store, he got out our airplane first-aid kit, which contained glue, canvas, mahogany, and screws, and had it ready when the boat caught up with us that afternoon. We pulled the plane up on a mud bank and Wilshusen replanked a section of the hull about 6 feet long, tapering from 4 feet to 2 feet wide.

This part of the hydroplane hull was veneer. Under ordinary conditions veneer is stronger than mahogany planking, but we soon found it had no place in the moist Tropics, where the glue became soaked and the thin strips warped and parted.

By the most strenuous work day and night, amid swarms of gnats and mosquitoes, and in beating rain, Hinton and Wilshusen stripped off the veneer and replaced it with solid planking. Two days later, with the help of 20 Indians, the hydroplane was eased into the water.

For the next six months two thin strips of mahogany with canvas between them were all that separated us from the water. However, six months proved to be just about the limit of their endurance, as the hull was practically water-logged when we landed at Manáos on our return journey, the latter part of March, 1925.

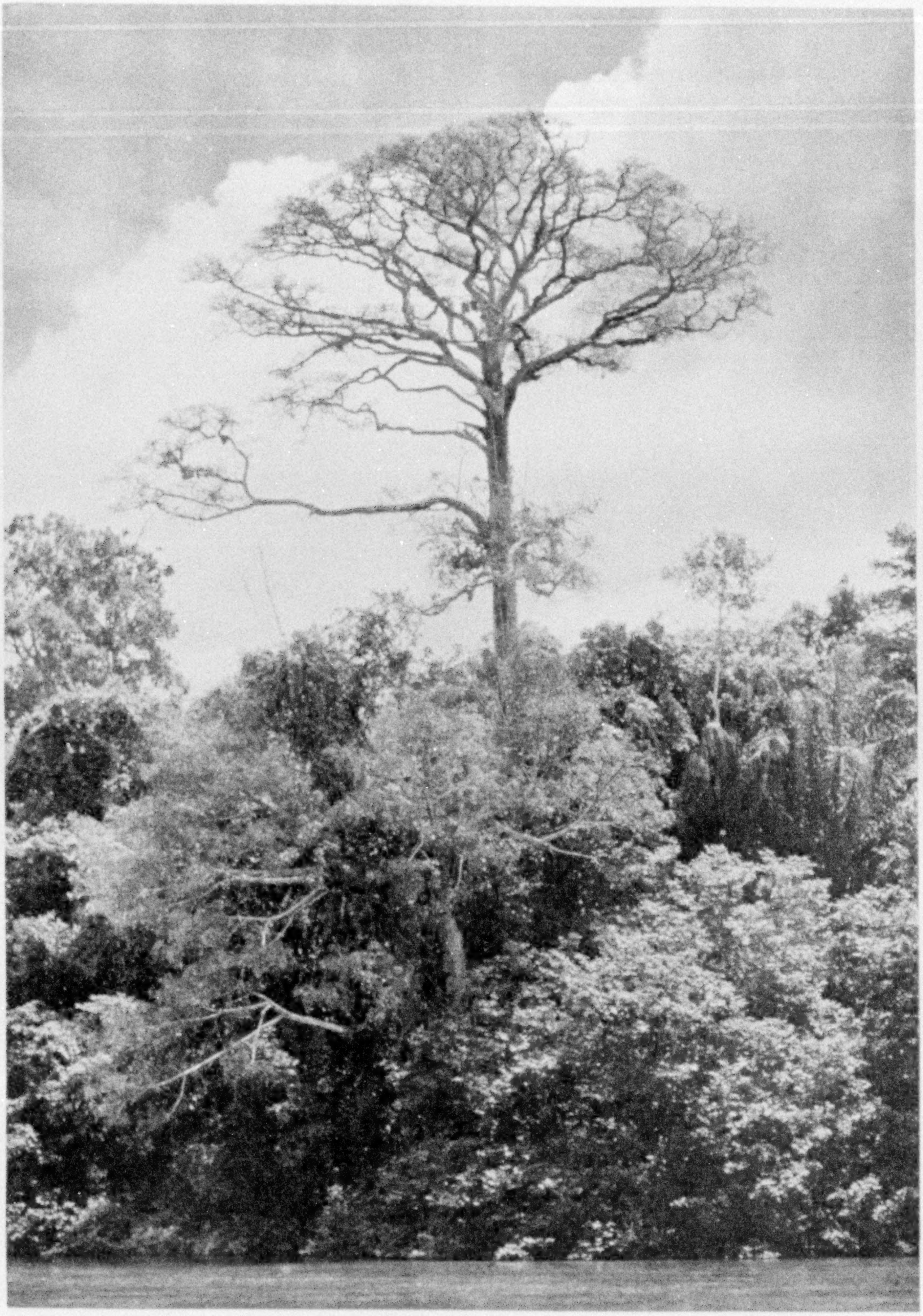
### WEATHER WORKS ON SCHEDULE ALONG THE AMAZON

The weather has a set schedule of performance in the Amazon Basin. The days usually dawn bright and clear. By 9 or 10 o'clock clouds gather and in the afternoon it often rains. The blanket of clouds, however, serves to temper the sun's heat and makes the days really less uncomfortable than many of those of July and August in the Temperate Zones.

The nights are very beautiful; the air is often so clear that the stars have the sparkle and snap of our coldest winter nights. The Southern Cross and Milky Way are much in evidence, while directly overhead in November, in the hours just before daylight, is the great constellation of Orion.

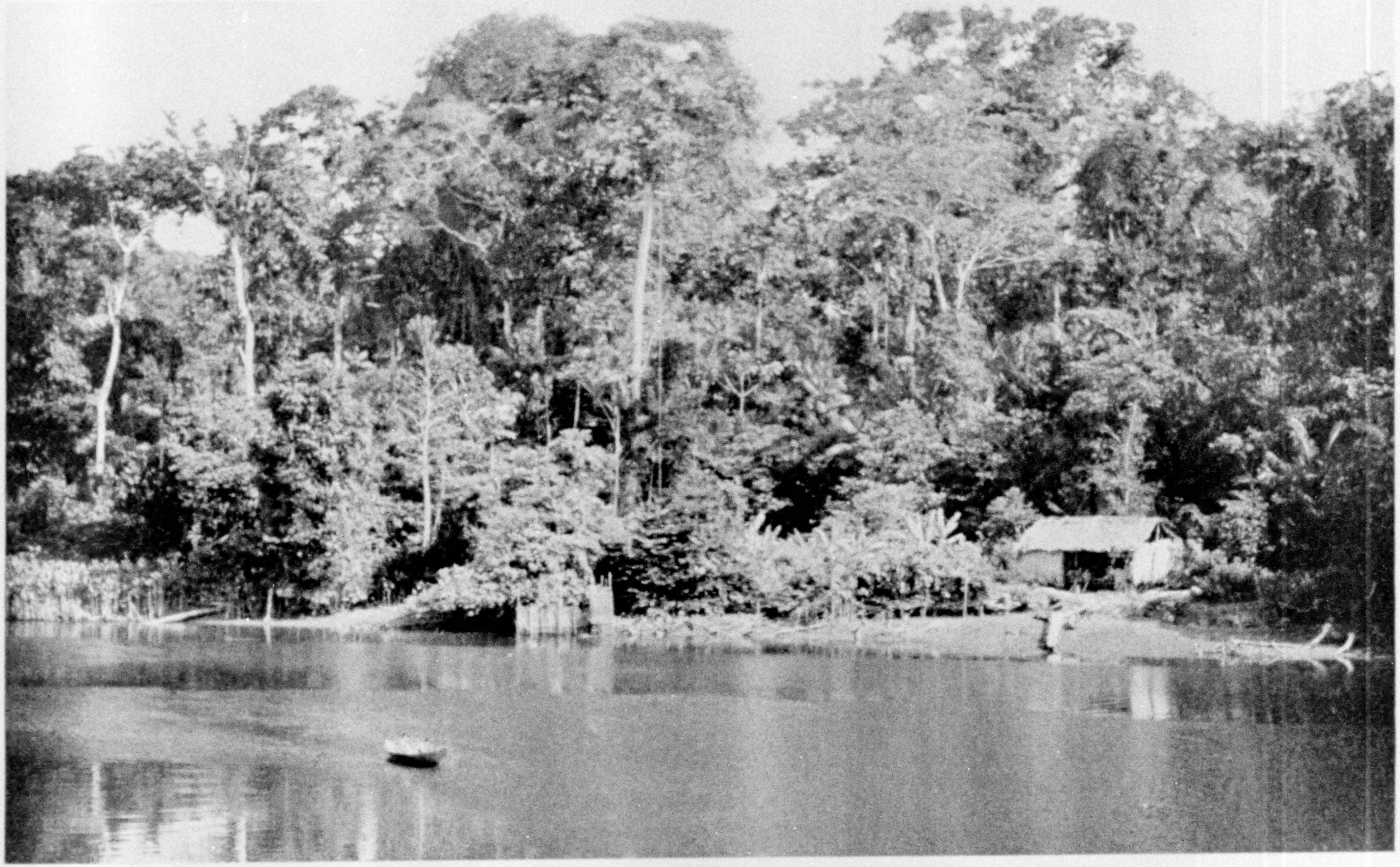
At this time of year, too, many of the planets and first-magnitude stars shine with great brilliance, and when the full moon is in the sky the night transforms the Amazon Basin into an illimitable fairyland of delicate light and shadow.

On the rivers, the rush of the water by the tangled jungle, the distant murmur



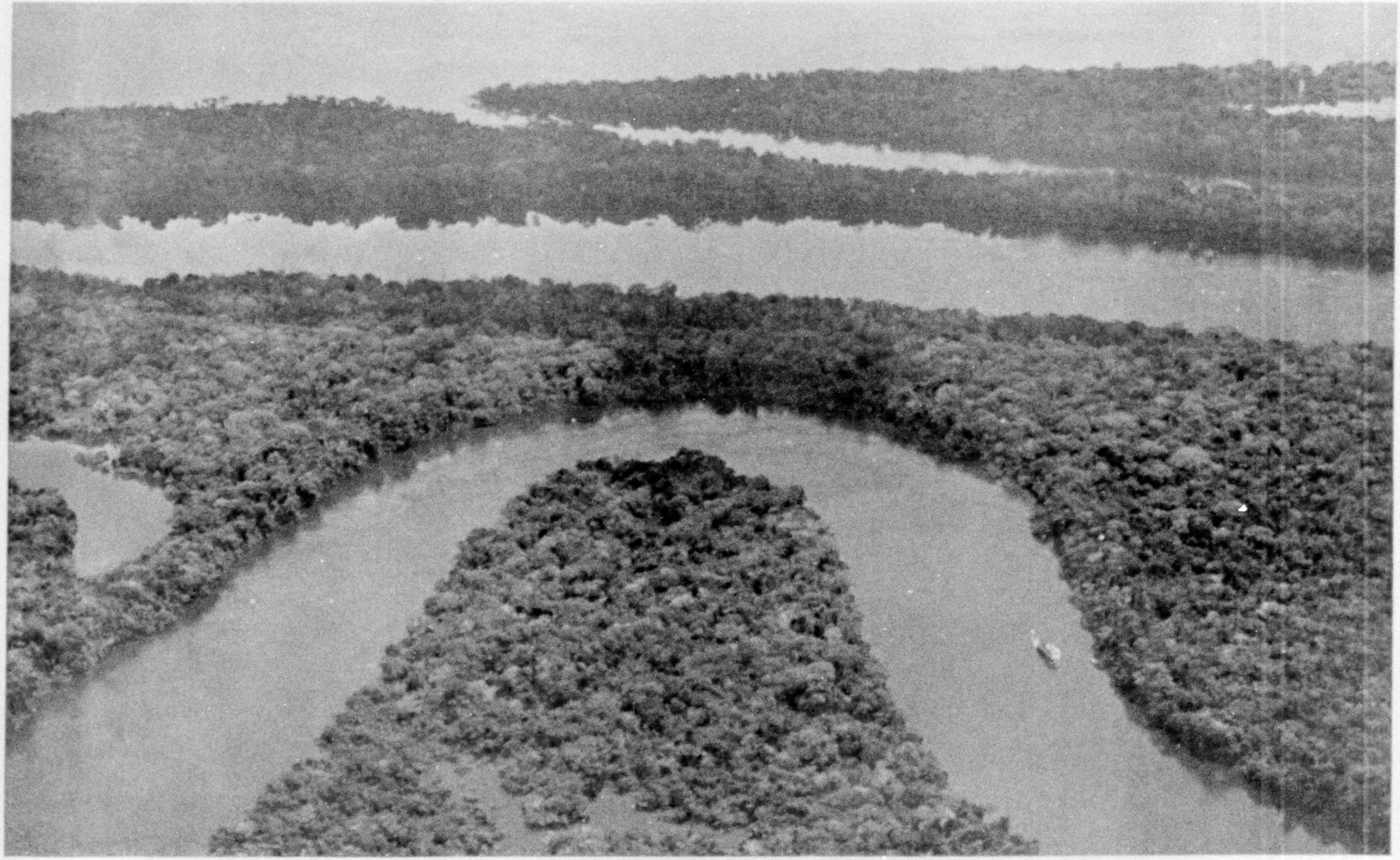
A GIANT OF THE AMAZON FOREST

This huge ceiba tree, supported by buttressed roots, towers 40 feet above the general level of the jungle. Note the wisps of vines swinging from the limb at the left, like a string of beads. Sometimes these parasitic growths resemble washing hung out to dry.



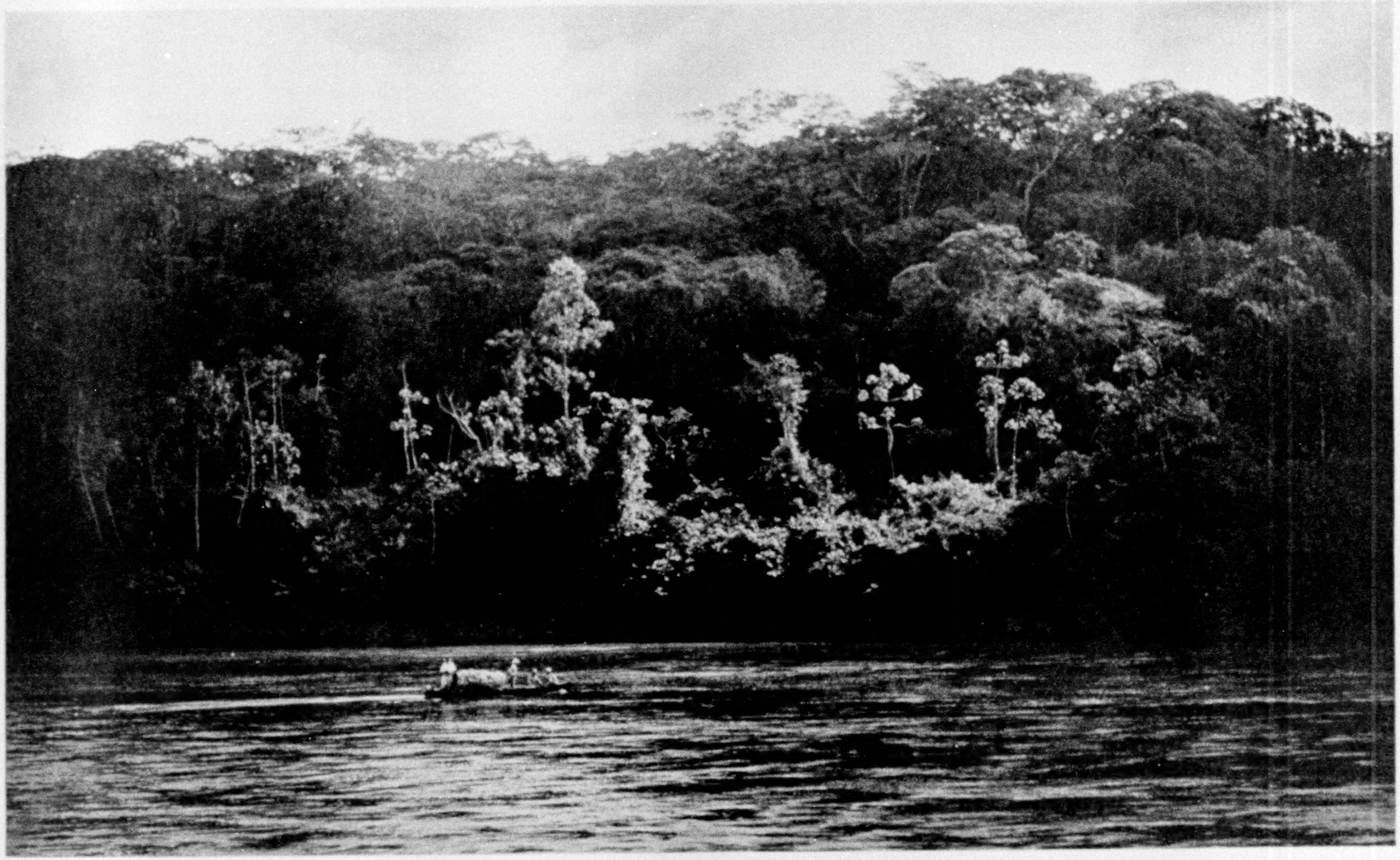
THE AVERAGE EXPLORER'S VIEW OF AN AMAZON FOREST (SEE, ALSO, PAGE 366)

"A high canopy of trees from whose branches hang vines and moss which spread their greedy fingers downward; beneath this, dense underbrush shrouded throughout the day in green twilight" (see text, page 385). Note the turtle pen in the center (see, also, page 383).



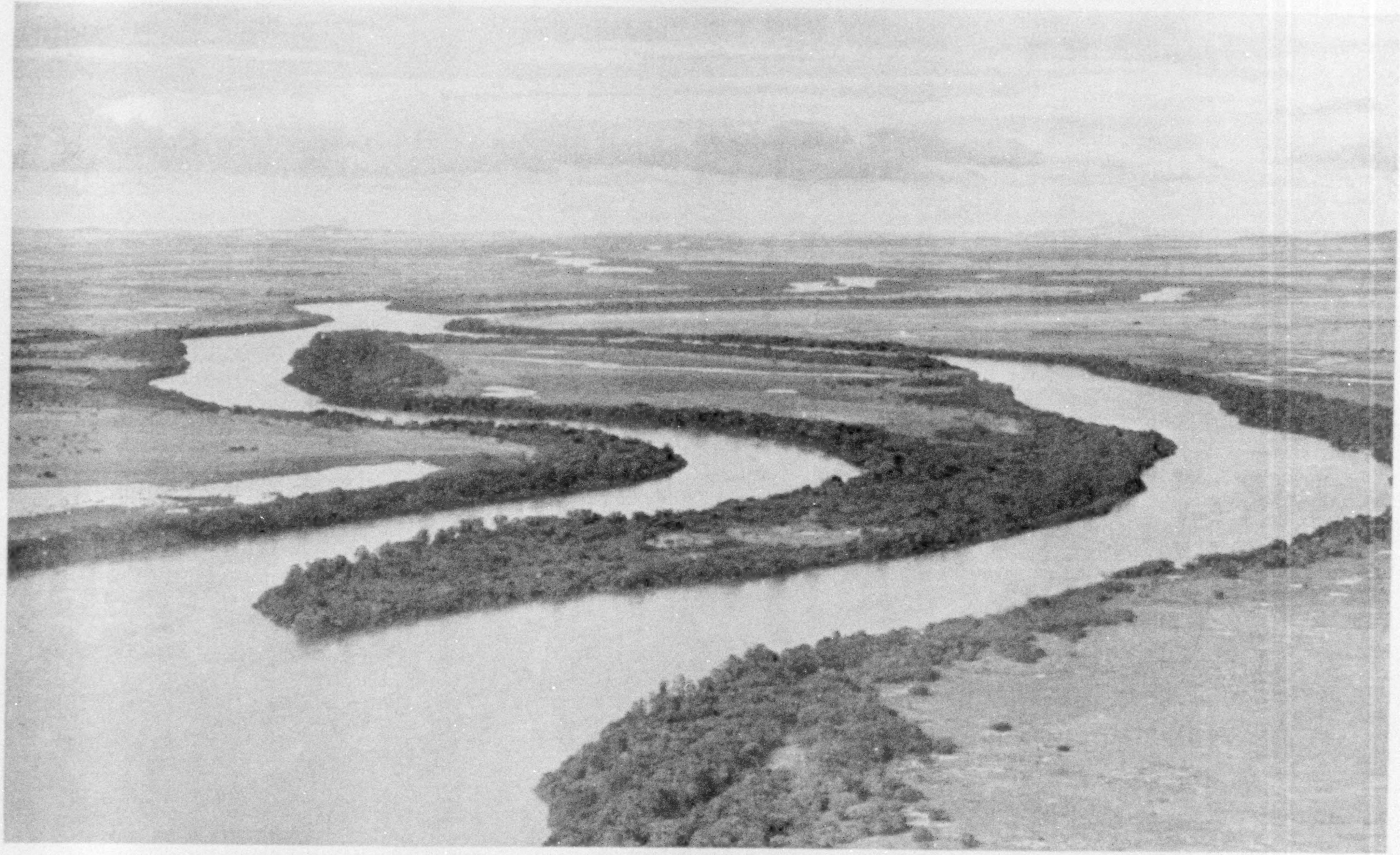
ISLANDS IN THE RIO NEGRO

In the right foreground the river steamer conveying the Rice Expedition is seen proceeding at five miles an hour up one of the narrow channels. Viewed from the hydroplane, the Negro appears as 15 miles wide for a distance of 50 miles above Manáos, the stream being filled with long, narrow islands, from which, after sunrise, wisps of vapor rise and almost exactly overlay them. Here and there the forest growth on the islands completely surrounds small bodies of water, thus creating apparent lakes in the river.



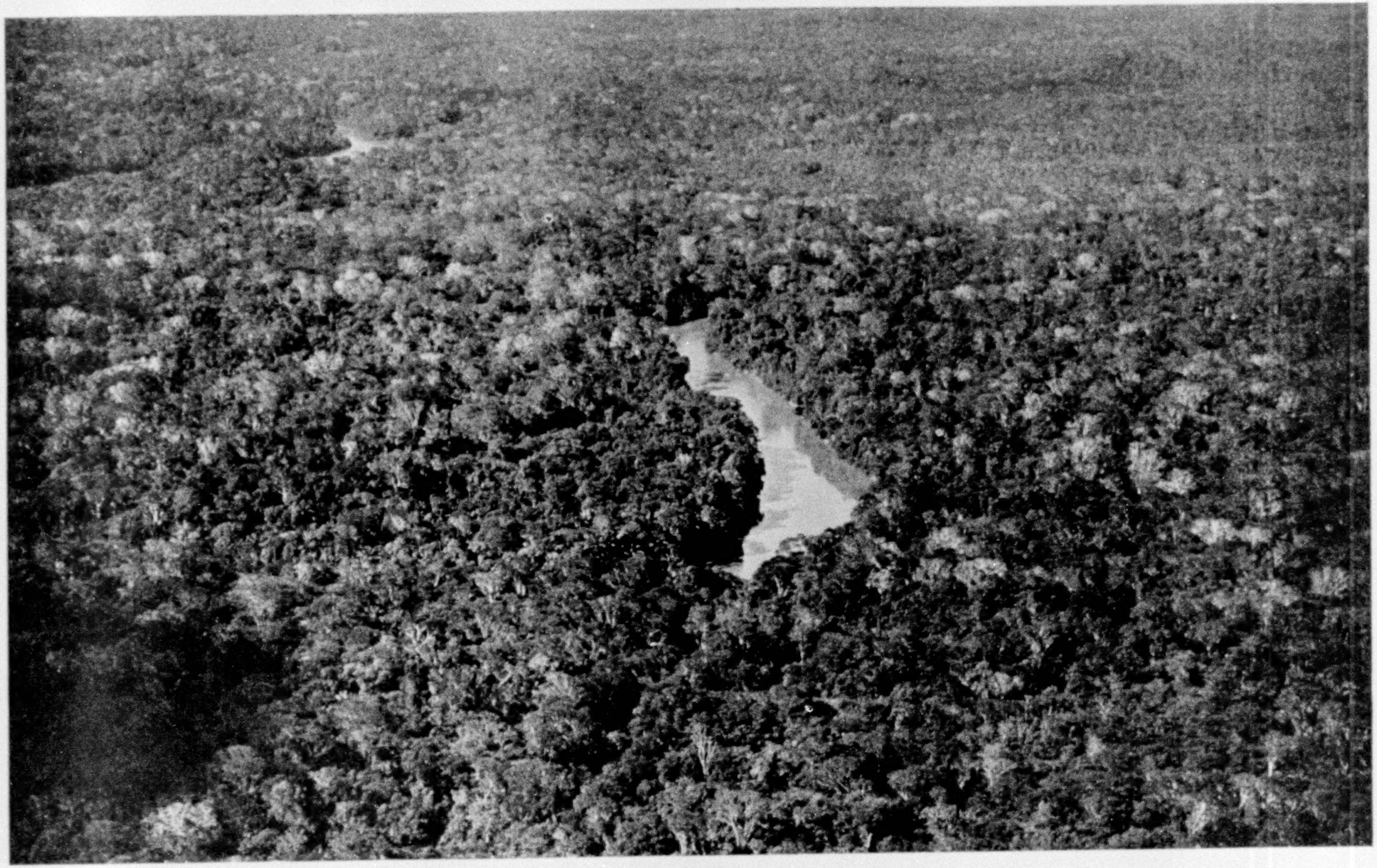
CANOEING UP THE URARICOERA RIVER WITH THE HELP OF AN OUTBOARD MOTOR

The open patch in the forested bank was probably caused by a tropical hurricane, such as that which occurred while the Rice Expedition was approaching the mouth of the Branco.



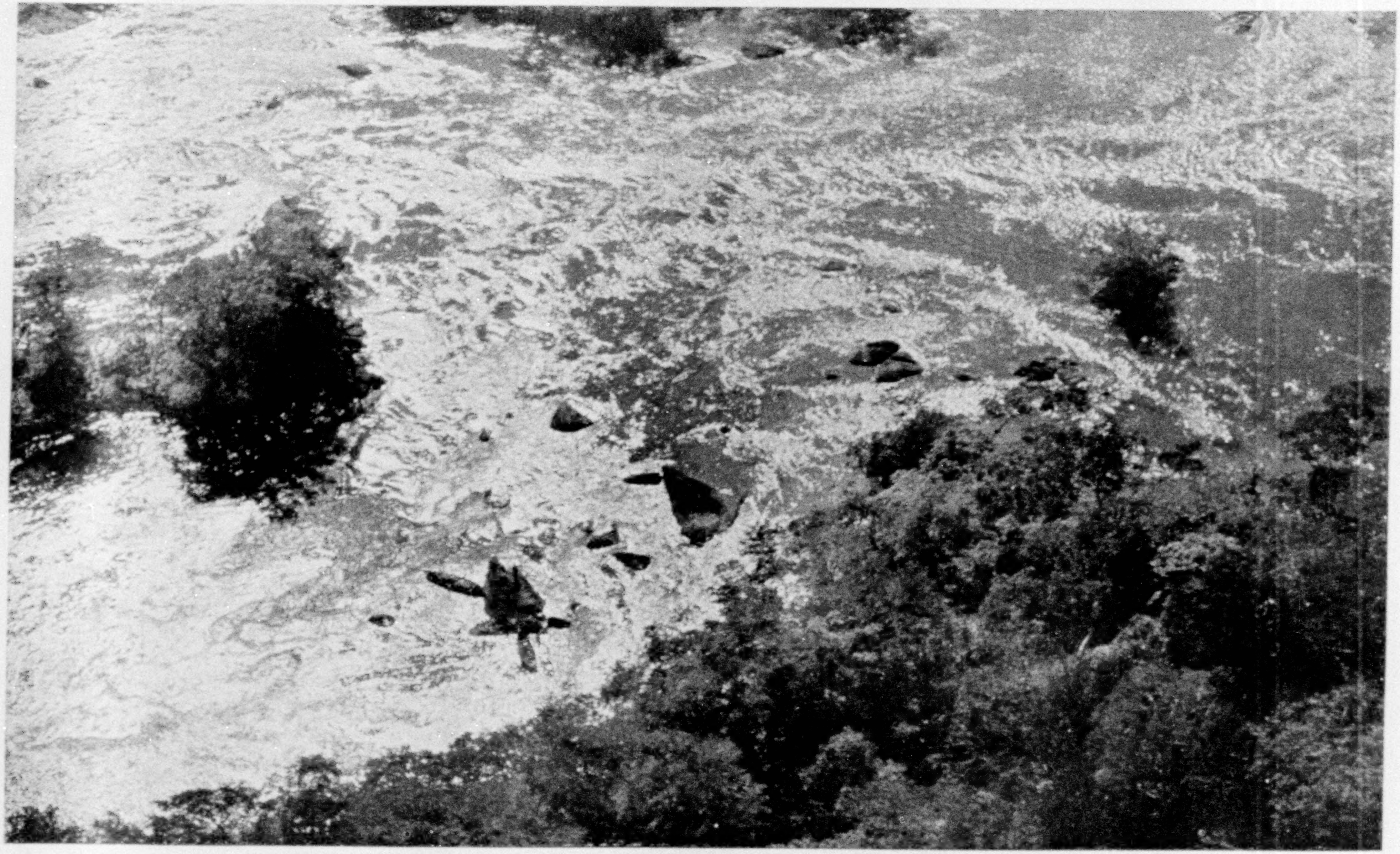
A COMMA-SHAPED ISLAND ON THE URARICOERA RIVER NEAR ITS CONFLUENCE WITH THE BRANCO

A single house, occupied by a Brazilian cattleman, surrounded by several huts for Indian cowboys and helpers, is known as the settlement of Alagadico. On all sides stretches the campos, a cattle-grazing region of 10,000 square miles or more, where wild herds roam and are rounded up once a year. The only fences are watercourses fringed with rows of palms.



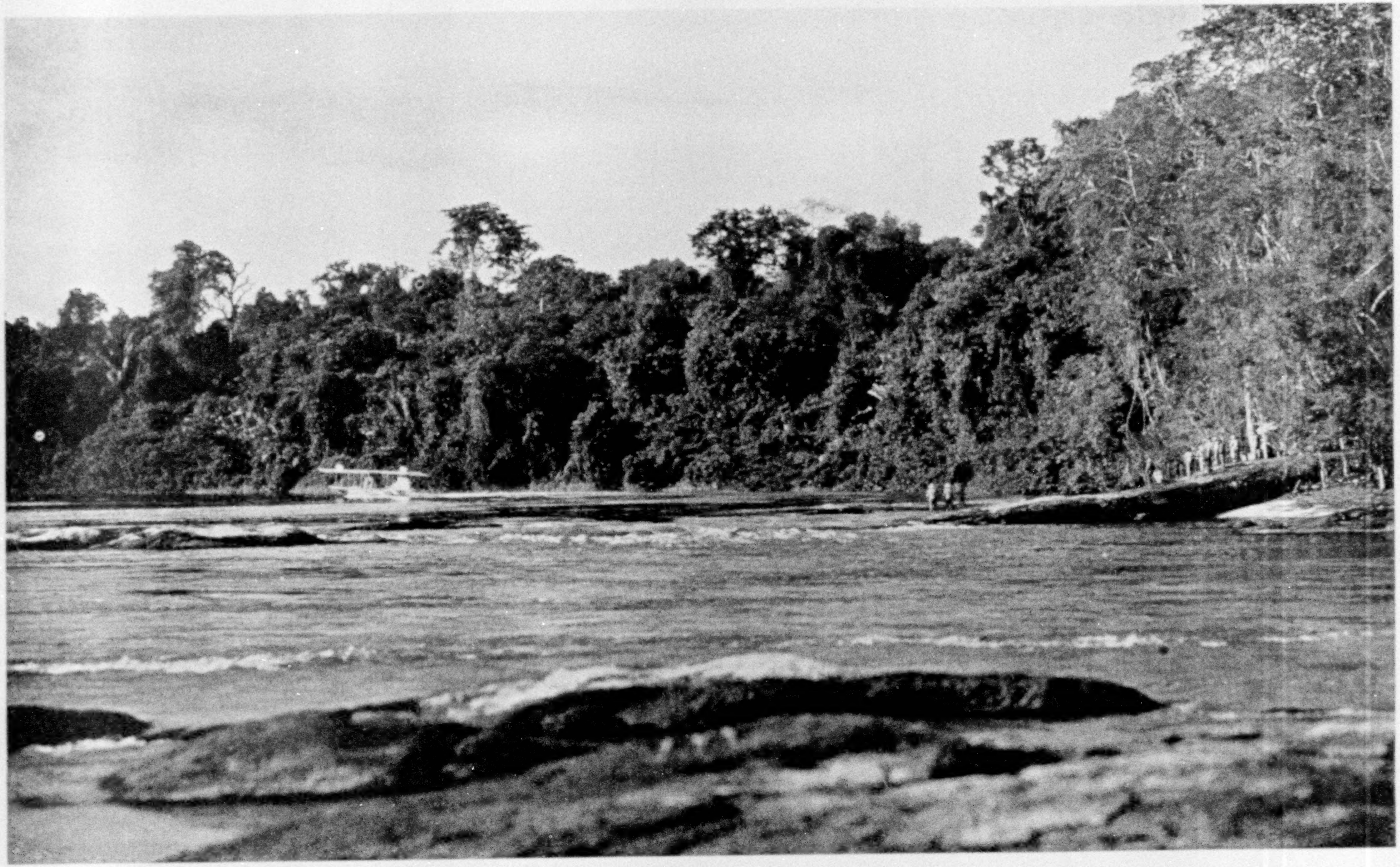
THE AMAZON JUNGLE FROM THE AIR (SEE, ALSO, PAGE 362)

"A sea of green billowing away over low hills, with palms scattered through the forest below, resembling hundreds of starfish at the bottom of an ocean, their lighter green focusing in strong contrast against the dark tones of the jungle" (see text, page 387). Following an unknown river through the tropical forest in a hydroplane is great sport, but one must keep an eye on the channel. A mile or two to the right or to the left and the river disappears. All that remains then is the unbroken sea of forest. After once following the river up its course, it is often possible to cut across bends coming down and fly by compass.



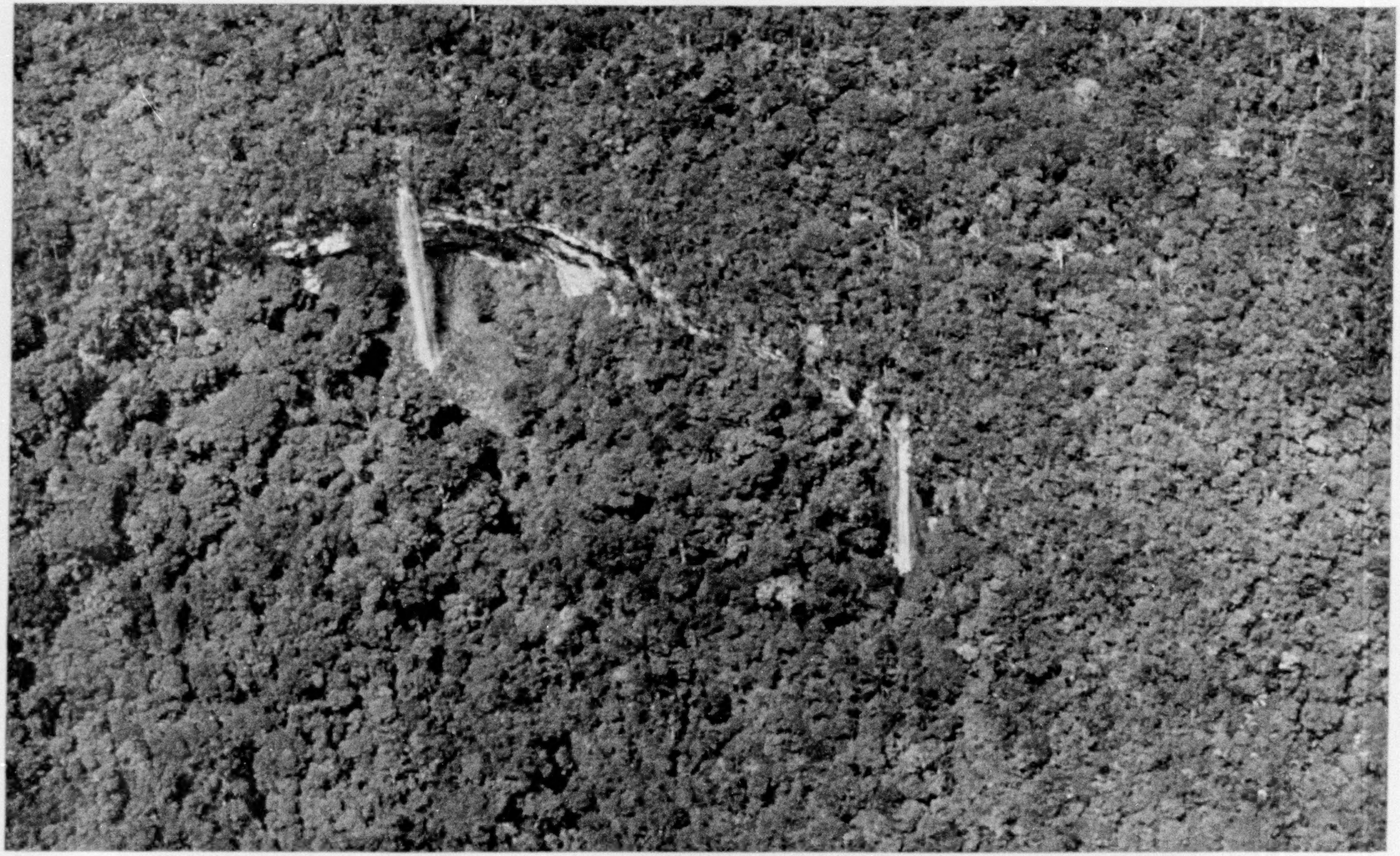
THE EXPEDITION MAKING ITS WAY UP THE ROARING WHITE CHANNEL OF THE RIO URARICOERA

On a rock in the lower center may be made out the figures of half a dozen men and two canoes. Rapids such as this extend for 100 miles on the Uraricoera above Maraca Island. They are not especially difficult for canoes, but require time, as the craft must be pulled up by long ropes (see, also, illustration, page 407). The heavier-laden canoes, requiring more water to float, were forced up through the swiftest water and frequently were swamped. Cases of gasoline, foodstuffs, and trade goods floating downstream were rescued by Indian helpers. On one occasion the expedition's entire stock of cigarette papers disappeared in swirling waters, and thereafter the thin bark of a certain tree, split into thin, flexible layers, had to be used for the "makings."



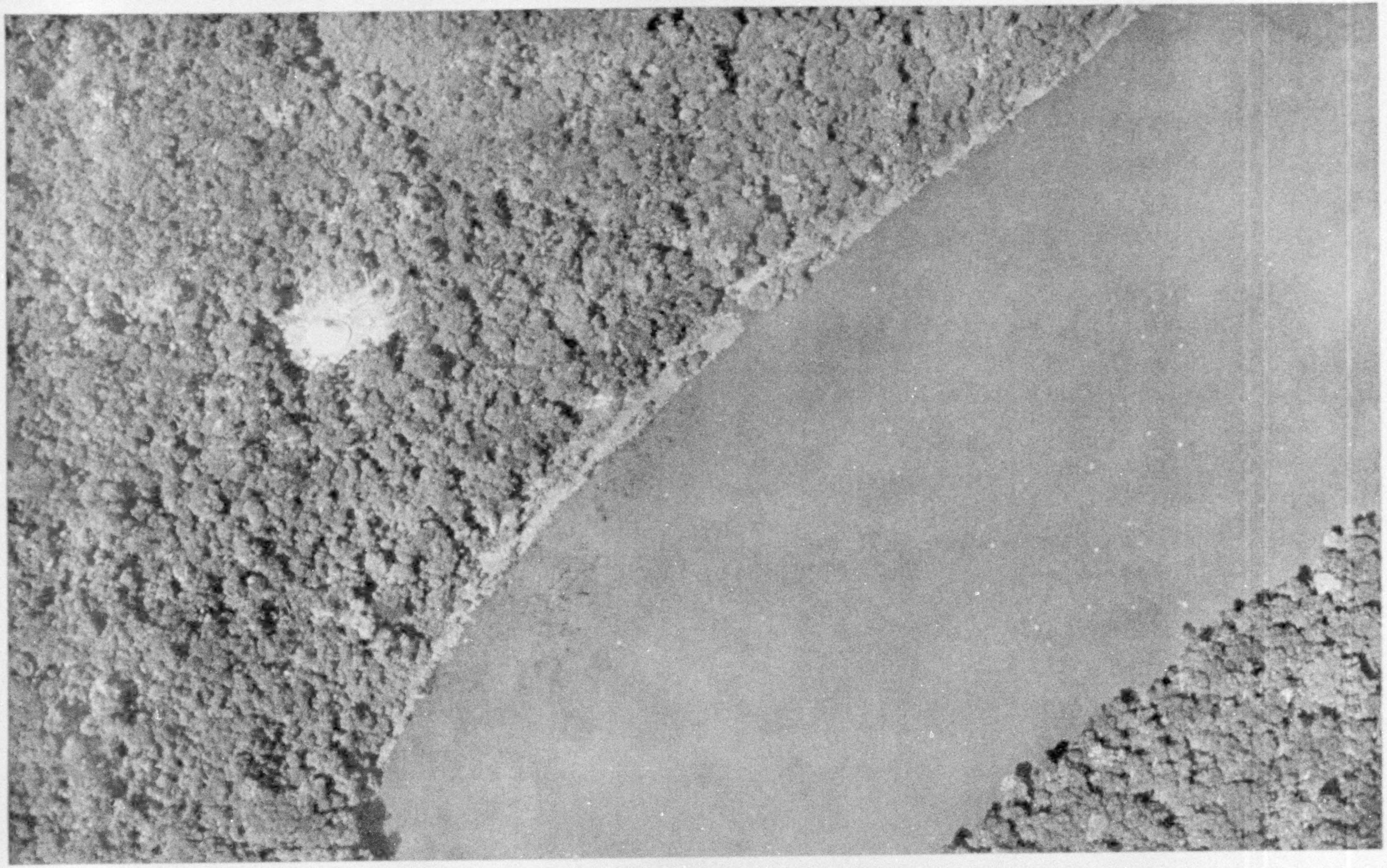
KULEIKULEIMA ROCKS, A PLACE OF DISASTER (SEE TEXT, PAGE 388)

This photograph, taken after the members of the Rice Expedition had reached the point where the hydroplane came to grief, shows the leader's shelter at the extreme right. The plane is about to take off from the only available landing spot for a hundred miles in either direction. The party remained here for two weeks, while gasoline was sent ahead by canoe and portage (see page 413).



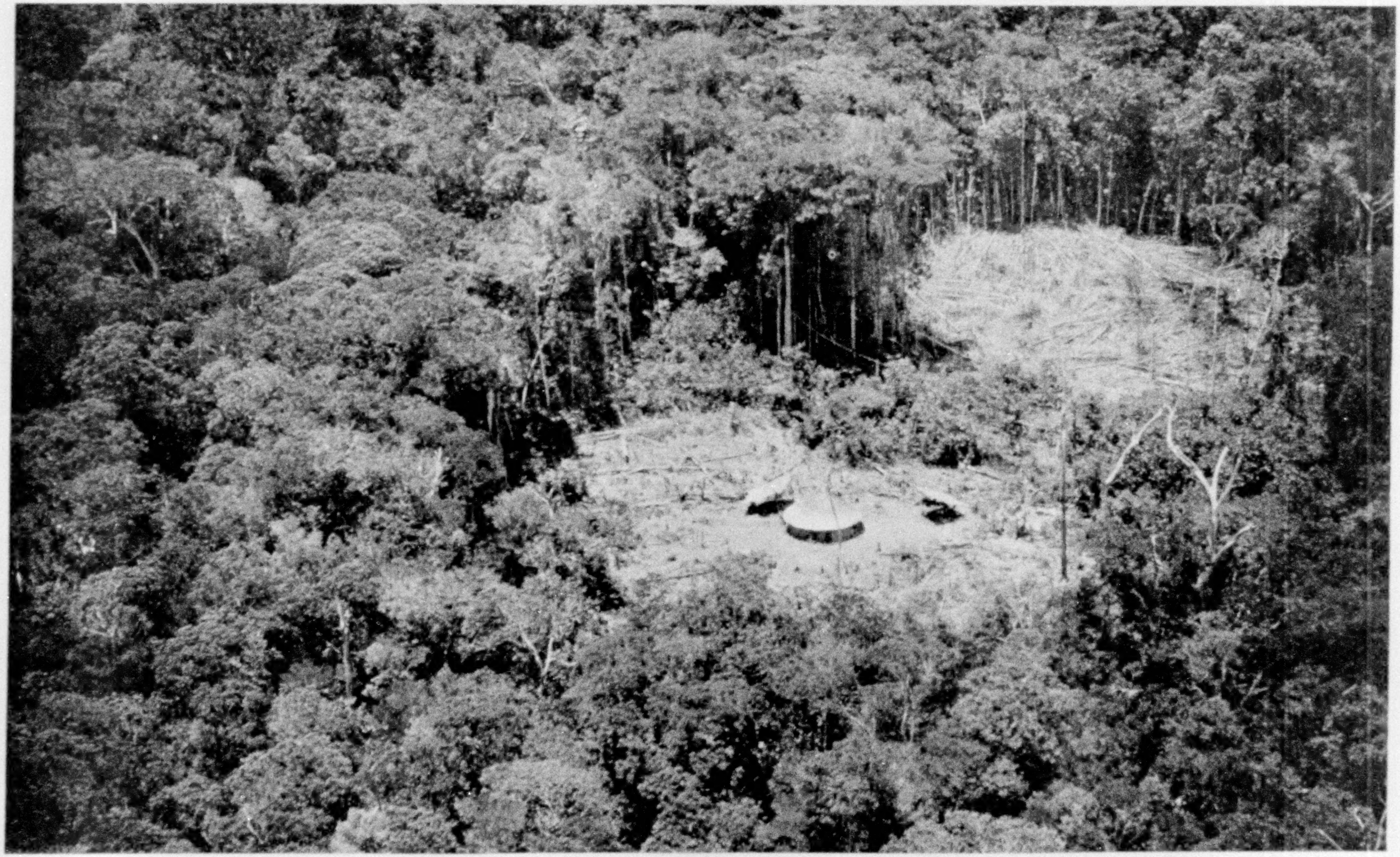
LOOKING DOWN ON A HORSESHOE CLIFF

White ribbons of water decorate these forest-clad rock walls of the Aracasa Valley. The source of the stream or streams back of these falls is hidden in the dense tropical growth (see text, page 415).



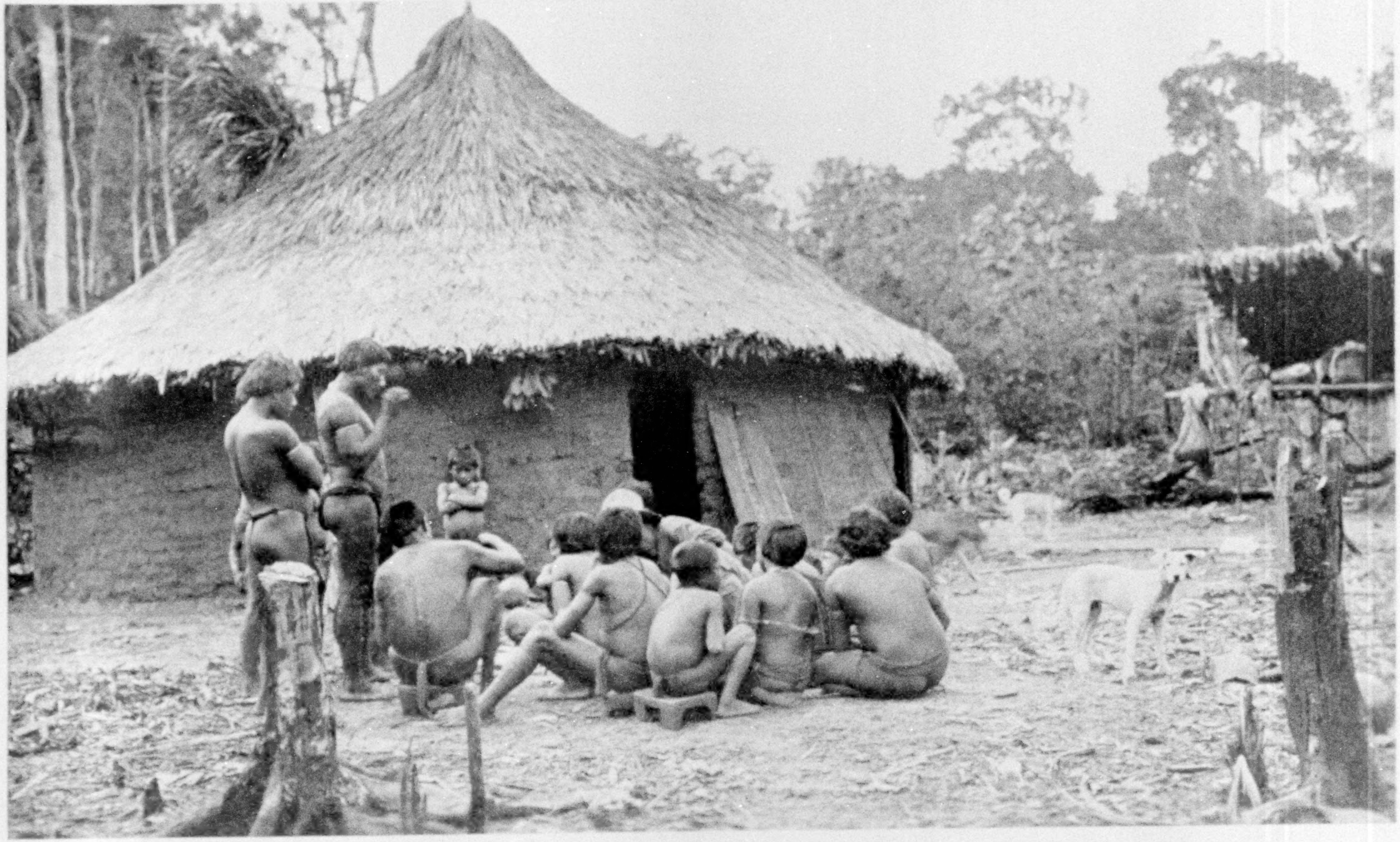
THE FLIERS DISCOVER THE CAMP OF AN UNKNOWN INDIAN TRIBE, SKILLFULLY CONCEALED FROM ALL EXCEPT THE AIRMEN

This photograph is characteristic of many other hidden Indian maloccas in the warring country of the upper Parima. Note that the hut, holding probably 30 men, women, and children, is located several hundred yards from the river, and that no canoes or other evidences of life are visible at the bank. Close by is seen a small stream, which appears, from canoes paddled by passing Indians of other tribes, just like any other small stream on the river. Up it, probably around the first bend, are likely to be found the dugout canoes of the tribe whose hut is seen so plainly from the hydroplane. The trail from the hut leads, therefore, not to the river directly, but to the place where canoes are tied.



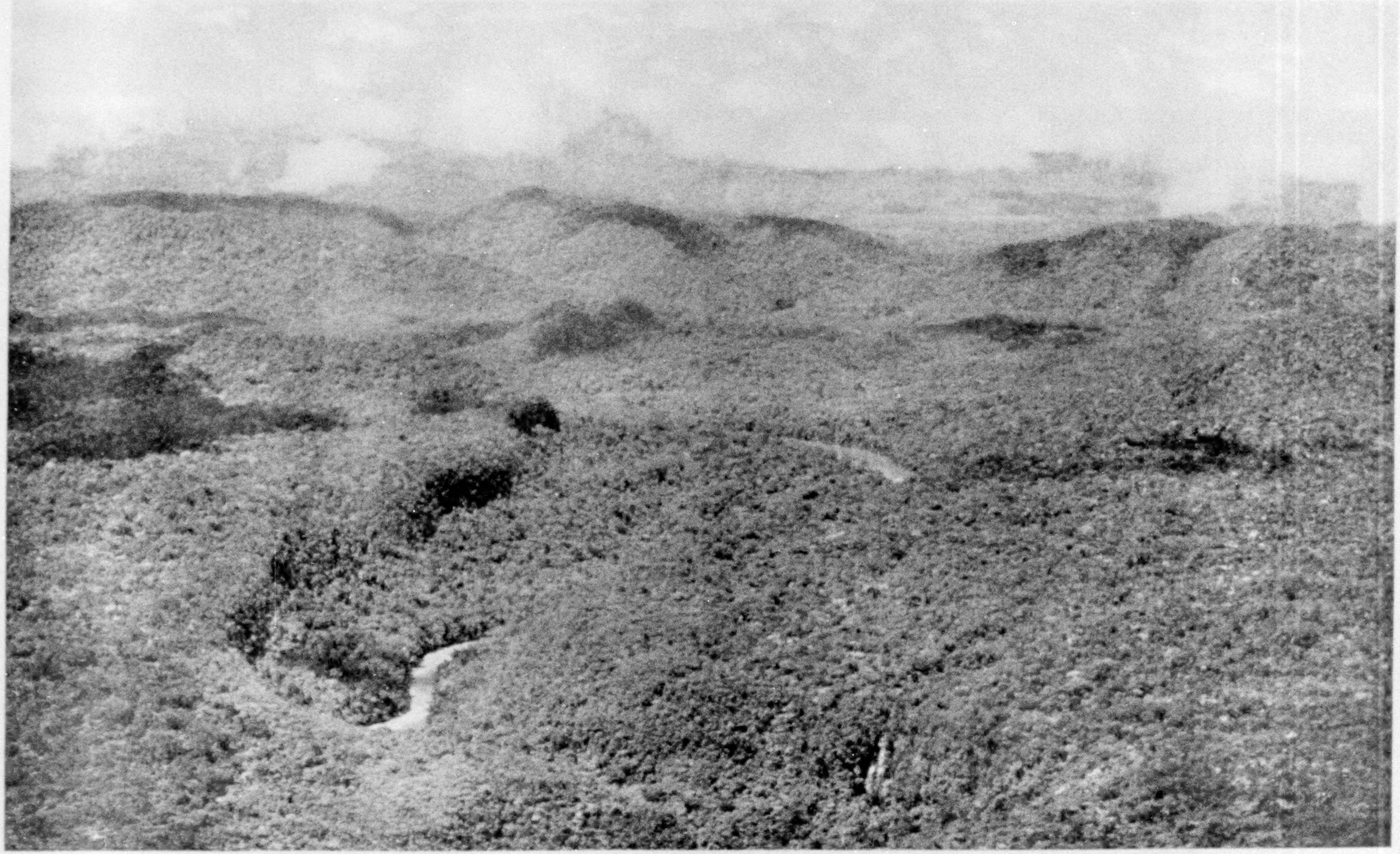
A NEARER VIEW OF THE CAMP ON THE UPPER PARIMA (SEE, ALSO, PRECEDING PAGE)

The hydroplane alighted in the river after circling several times over the camp. The Indians, realizing that their home had been discovered, shortly came out of the inlet in a canoe. Their faces were painted with red ocher and long sticks were thrust through their ears. In the canoe were spears and bows and arrows, but they made no hostile gestures. With a sack of old clothes and other articles of trade, the pilot and the author climbed from the plane into the canoe and were paddled into the inlet (see, also, next page).



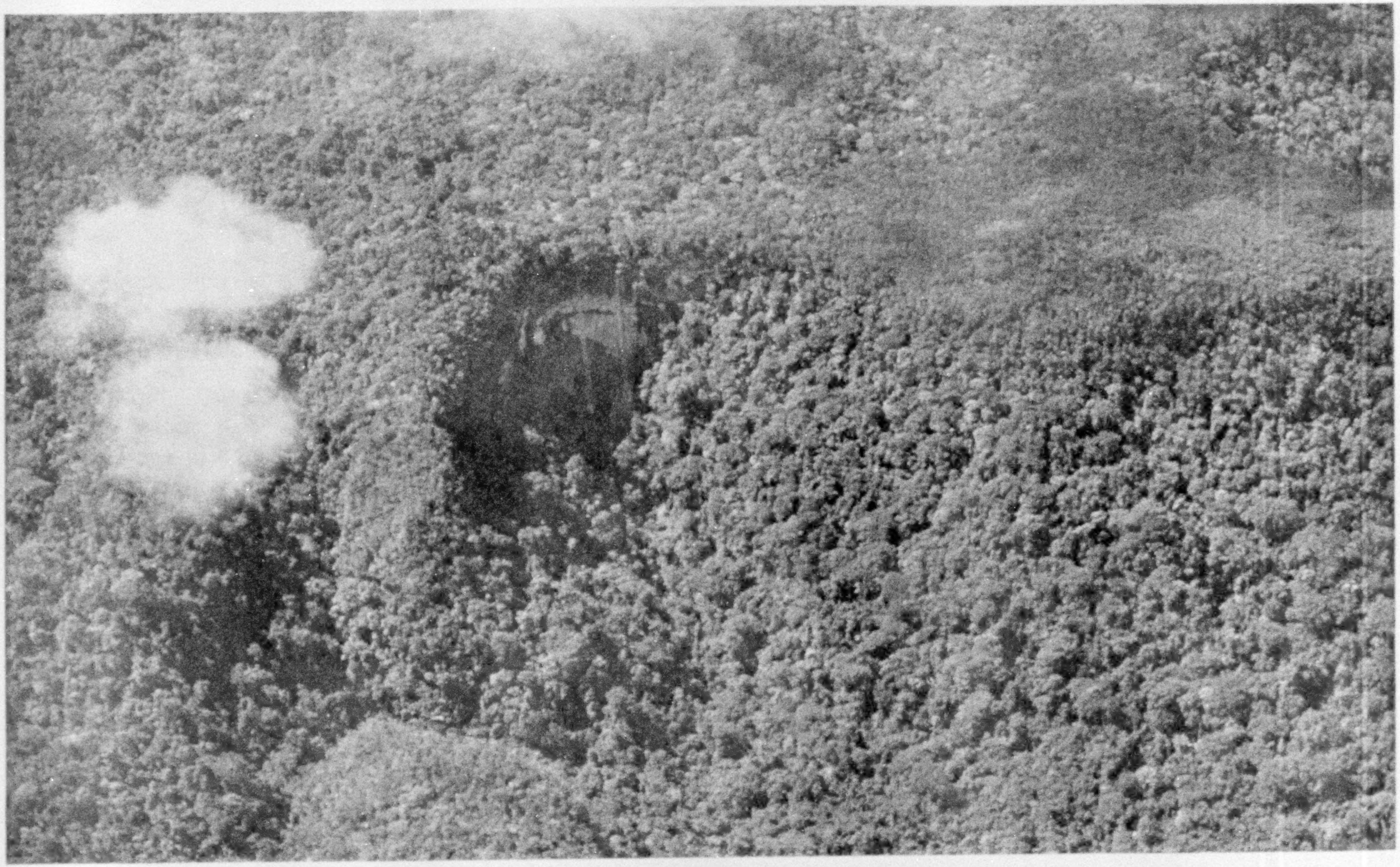
THE OCCUPANTS OF THE COMMUNAL HUT ON THE PARIMA (SEE PAGES 370 AND 371)

Pilot Hinton is seen in the center of the group, trading clothes and knives for bows and arrows and blowguns. Note the way in which the arms of the man and woman at the left are bound above the elbow (see, also, illustrations, pages 396 and 411). With some Indians leading the way, and others falling in behind, the airmen had followed a faint and narrow trail through the dense forest to the malocca. Because of the white men's greater height, they had to bend continually to get under vines and limbs, but the Indians, of shorter stature, slipped along very easily.



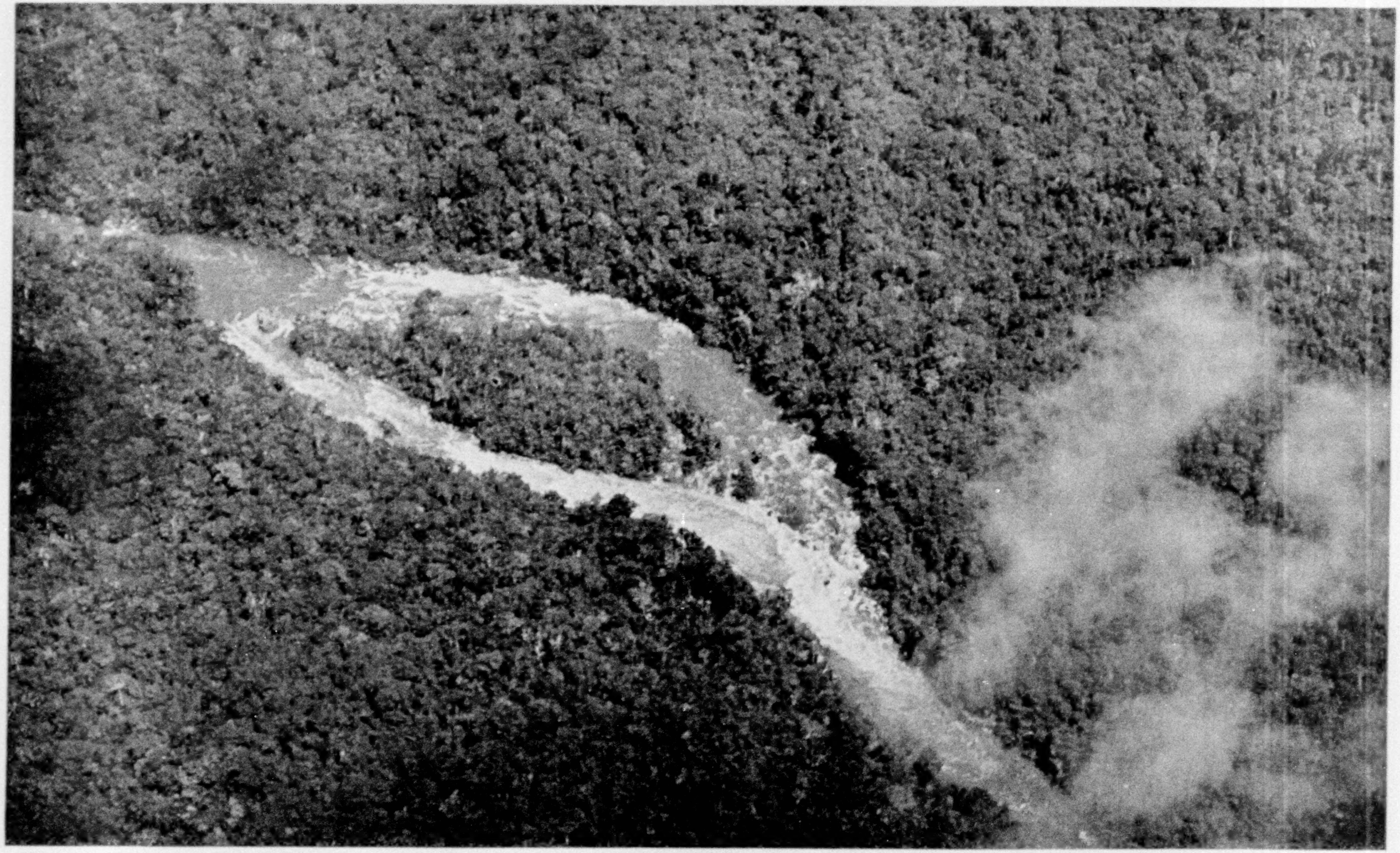
THE AIRMEN REACH THE HEADWATERS OF THE RIO PARIMA

Note the steepness of the canyon walls in the center foreground. Just to the right are white vertical streaks, showing water from a mountain stream falling over a cliff into the river below.



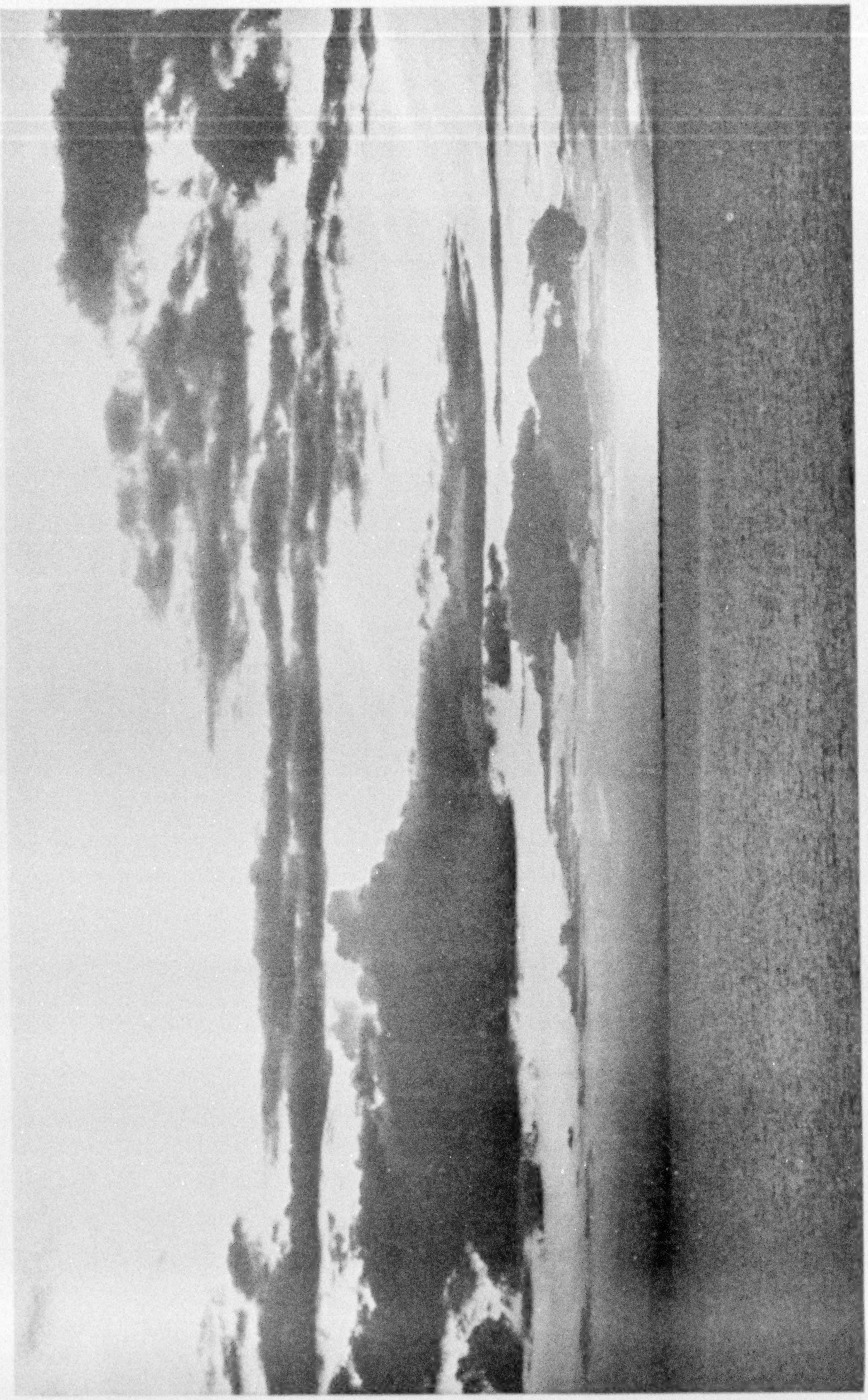
LIKE SUN SPOTS ON THE FACE OF THE SUN

As the plane flew into the higher country of the Parimas, black spots appeared ahead from time to time. At one angle of view they looked like holes into the interior of the earth, and at other angles like dead black lakes of pitch surrounded by perpendicular walls. As the plane approached these spots it was seen that they were really huge cliffs, over which, in many cases, tiny streams fell like ribbons for hundreds of feet, disappearing in obscurity below.



THE AVIATORS ARE TRAPPED IN THE PARIMA GORGE

With an engine near the boiling point because of the excessive heat of the region, the aviators could do nothing but follow the curves of the canyon for miles, until they struck smooth water at the Aracasa River, steadily losing elevation in the meantime. The photograph was made at a sharp angle, and therefore does not show the steepness with which the sides of the gorge rise from the river. Note that the forest grows to the very edge of the water. Pilot Hinton and the author were the first white men ever to gaze on this section of the Rio Parima (see text, page 415).



SUNSET ON THE AMAZON

of the rapids, the peculiar odor characteristic of all the forest, and even the harsh roar of the howler monkeys far inland, all add to the fascination of this wilderness.

### MANY ASK MEDICAL ATTENTION

Our expedition was a progressive medical and dental clinic as well as a party of exploration. We had not only our own sick to attend, but also the ailing for miles up and down the Branco. Word that our leader was a physician magically flew before us along the river, and although it was aside from their purpose, Dr. Rice and Dr. Shattuck could hardly refuse the requests for dental, medical, and surgical treatment, which was given to Portuguese and natives, alike.

To reduce the transportation of supplies, we lived off the country wherever possible. The chief foods obtainable were farinha (a sort of flour) and beef. Oranges, pineapples, and bananas grow wild along the river and they often provided welcome variety for our diet, while fish of many kinds also graced our board. The cowfish of the Amazon tributaries is similar in line and color to the American catfish, but sometimes grows as large as a tarpon.

Vicious piranha always offered good sport as well as good food, but these ferocious flesh-eating fish make swimming dangerous. Attracted by a little blood from a scratch or cut on any living thing in the water, or sometimes even without this invitation, these razor-toothed creatures take only a few minutes to strip the flesh to the bone of either man or beast. Many a native has one or more fingers missing at the first joint, due to the voracity of a piranha, which took a bite while a hand pushing a canoe paddle was left carelessly in the water (see illustration, page 412).

### THE INDIAN STAFF OF LIFE IS MADE FROM A POISONOUS ROOT

Farinha, made from the mandioca root, which closely resembles our parsnip in appearance, is the Indians' staff of life, and it became an important addition to our own diet.

Eaten raw, this root is poisonous; but the natives have learned to pull the mandioca's "fangs." Each family has a piece of tree trunk pared slightly concave on one side, and this shallow trough is studded with pieces of flint set in pitch. The women shred the mandioca roots on this grater, then pack the white fluff in long woven mat tubes (see pp. 414-415).

After soaking these tubes in river water the contents are partly drained by suspension and by pressure primitively applied on the principle of the tourniquet. This operation, which washes out the poison, is repeated a number of times before the farinha can be used as a coarse flour for bread.

We found this food satisfying and wholesome, but rather tasteless. Its link with Indian religion shows its importance in the scheme of jungle life, for the natives believe that their principal deity taught their ancestors the method of extracting the mandioca's venom.

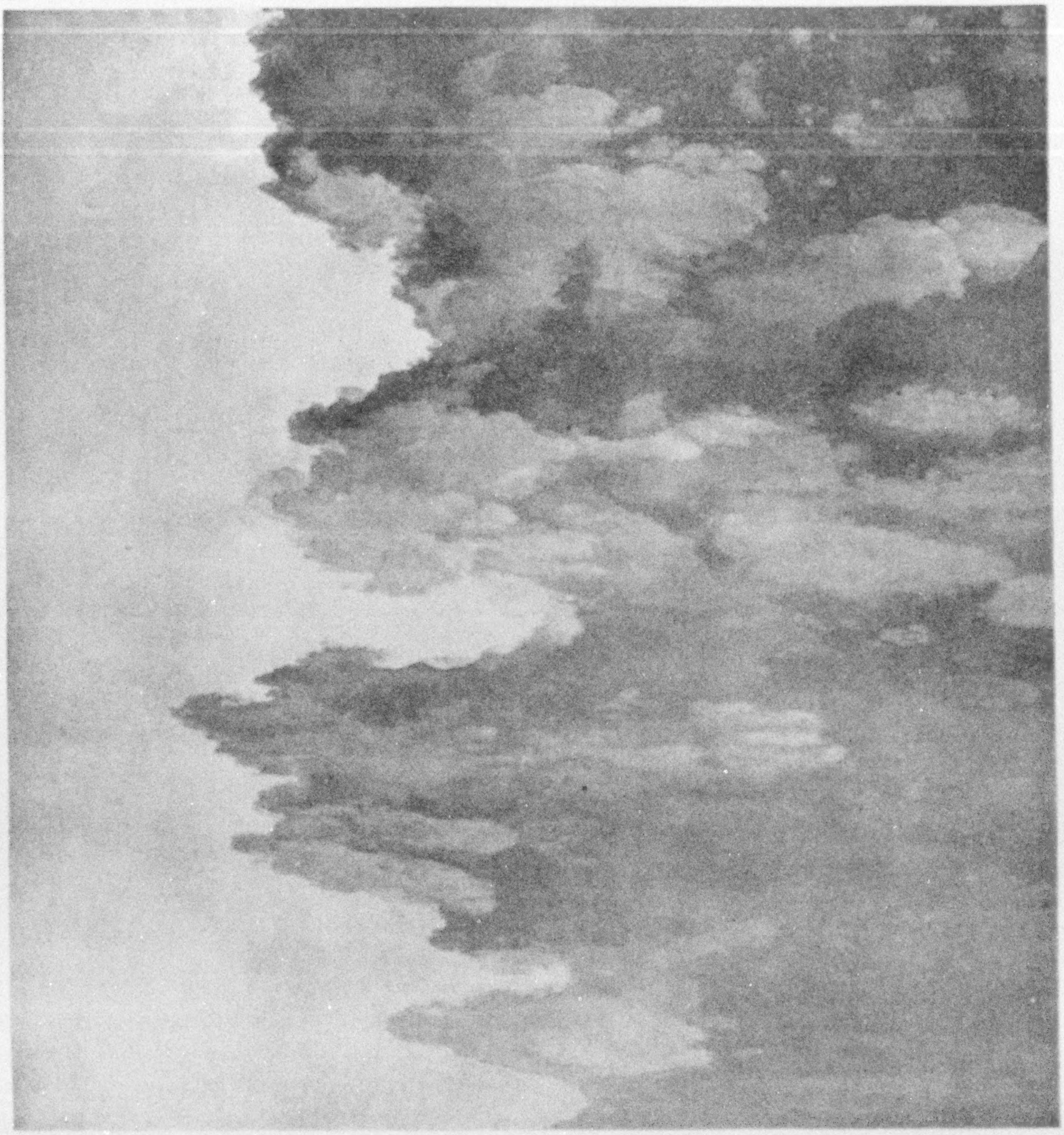
### FEVER SMITES THE EXPEDITION

Disease came closer to arresting the expedition than any other obstacle encountered. Despite the best mosquito nets, the use of quinine in 5-grain doses, and the presence of two physicians, many of us contracted fever. Our greatest loss was in the death of Dr. Koch-Grünberg, who was stricken early in September and died 10 days later, at Vista Alegre.

Besides Dr. Koch-Grünberg, both surveyors, one of the two wireless men, Dr. Grünberg's assistant, the airplane pilot and the mechanic, the launch engineer, and the cook, all had fever. Furthermore, the captain and almost all of the crew of the river boat that brought the expedition to the head of steamship navigation were stricken with the malady on their return to Manáos.

I escaped the fever for nearly a year, but finally contracted a "walking case." Prompt use of quinine in doses totaling 150 grains in three days proved effective.

The worst zone of disease is the lower river. After the mountainous region is reached, fever is no longer greatly dreaded; but, once contracted, it recurs from causes ordinarily insignificant. For instance, a flight by Hinton for a little more than an hour, at 6,000 feet elevation, put him flat on his back, although the temperature encountered was only 55



VIEW FROM THE HYDROPLANE OF THE RIO NEGRO FLOWING INTO THE AMAZON: PHOTOGRAPH TAKEN AT AN ELEVATION OF 5,000 FEET

The black waters (right) of the Negro are mingling with the yellow waters (left) of the Amazon. This is the way the water appears, too, to the traveler gazing down from the bow of an ocean-going steamship, as it passes up the Amazon, just before turning into the Rio Negro. Manáos is located on the north bank of the Negro, less than ten miles from the junction.

degrees. When one has been experiencing 85 and 95 degrees for many months, this temperature seems very cold and is sufficient to offer the fever a foothold if the system is weak.

### BOA VISTA, A REFUGE FROM MALARIA

On October 25 we were glad to skim the waters before Boa Vista (Good View), the only considerable town on the Rio Branco. The same reasons that make Omaha the biggest city of Nebraska and Simla, in the hills of India, the British summer capital, make possible Boa Vista. Its population, we were assured, is "over 500."

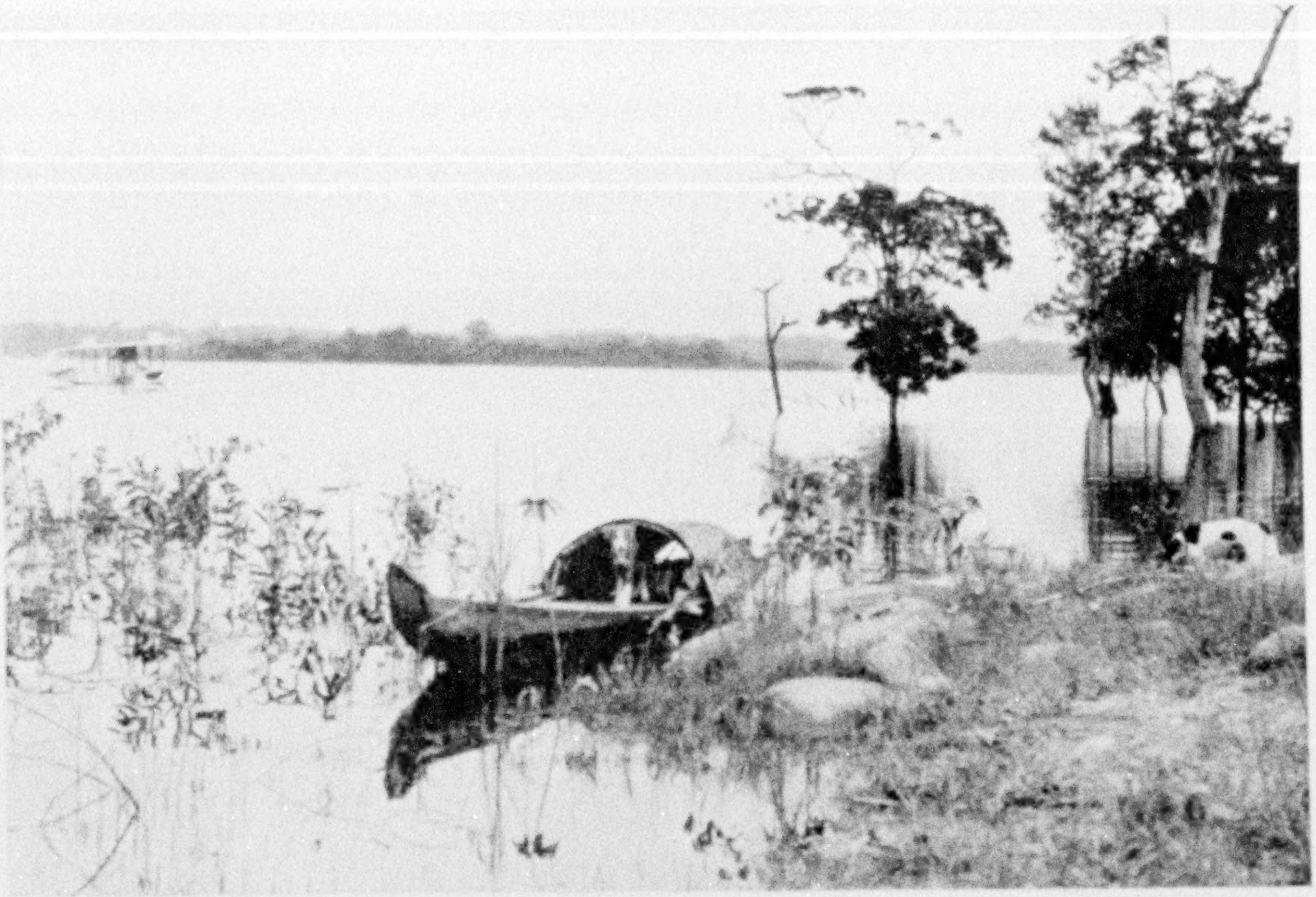
Like the Nebraska metropolis, Boa Vista is the shipping point of a cattle country, and, like Simla, it is high and relatively free from malaria. Close to the

A MISHAP TO THE AËRIAL

Santos, the motion-picture operator of the expedition, performs an unpremeditated acrobatic feat when he pulls the wrong rope while rigging the radio apparatus.

"LISTENING-IN ON PITTSBURGH" FROM THE DEPTHS OF THE BRAZILIAN JUNGLE

Left to right: Hinton, the pilot; Wilshusen, the airplane mechanic, and Dr. Rice, leader of the expedition; in the foreground, MacCaleb, one of the radio telegraphists. During the expedition's work in the field, messages were exchanged with San Francisco, Chicago, London, and New Zealand, and for months a regular schedule was maintained with New York. A small canoe radio set was taken to the headwaters of the Parima, and even here communication was established with the United States.

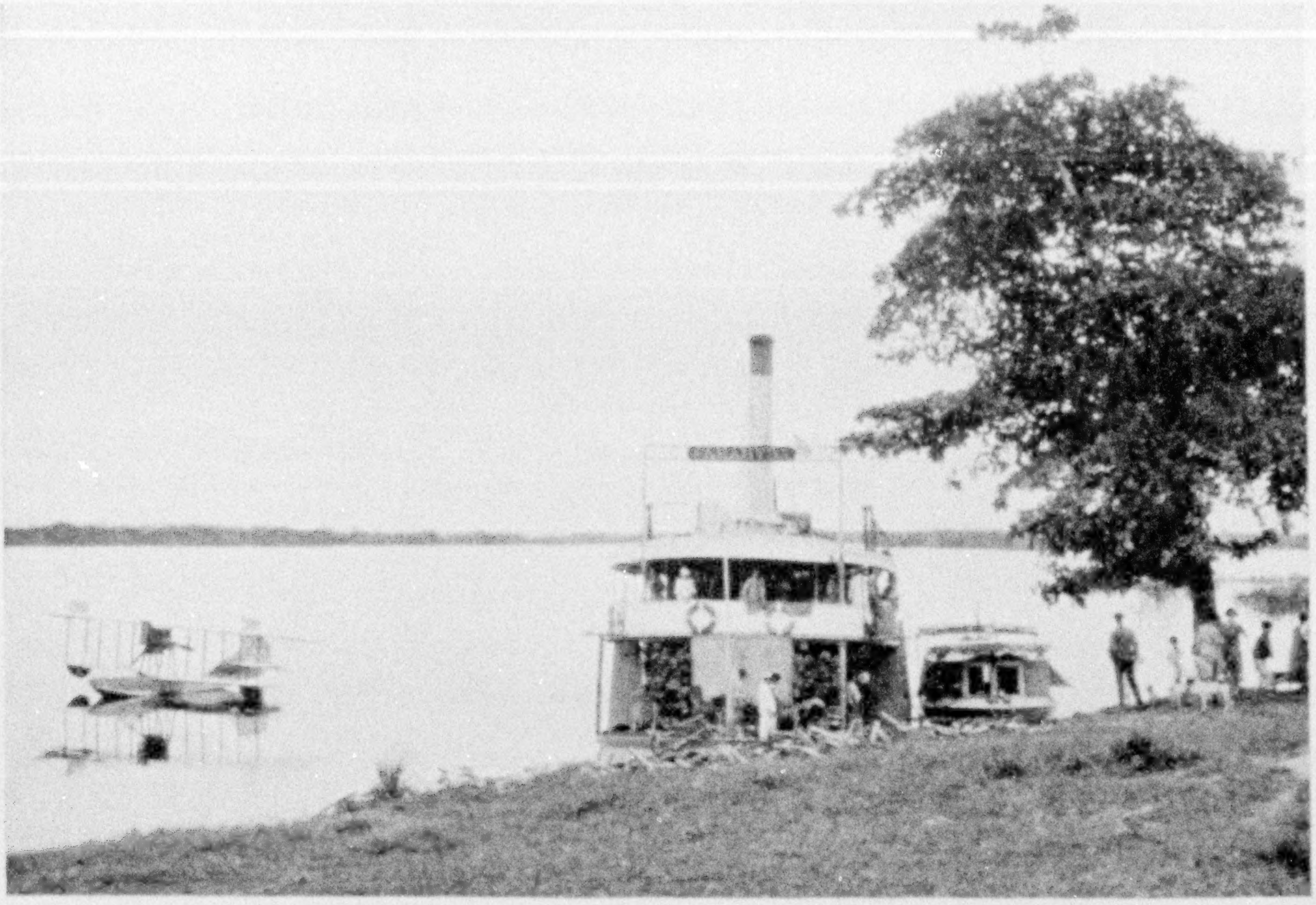


THE "ELEANOR III" ANCHORED IN MIDSTREAM: RIO NEGRO

In the foreground is the canoe which ferried the pilot and the author back and forth between ship and shore.

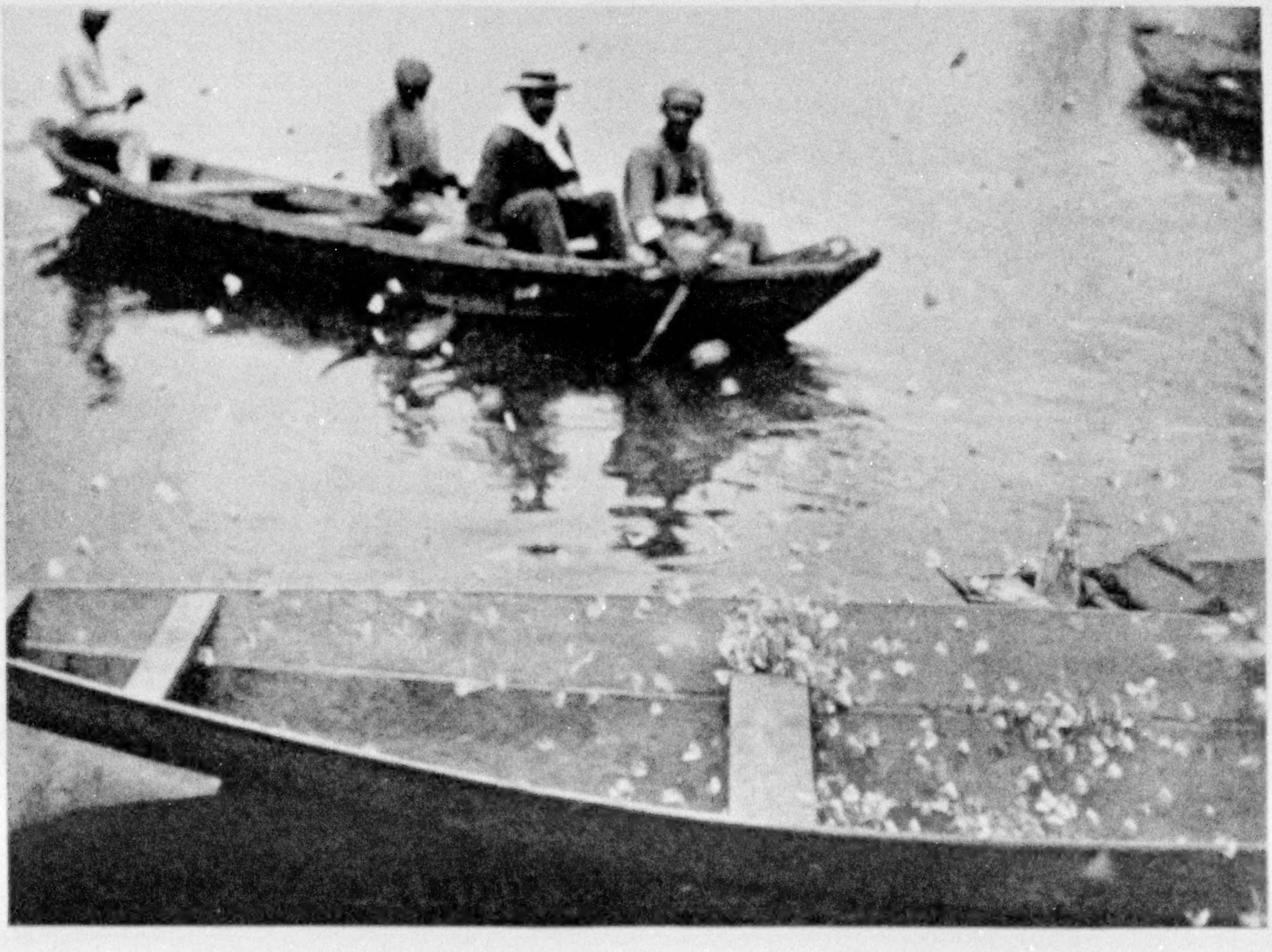
HINTON PAINTS CARVINGS WITH FRUIT RIND, SO THEY WILL PHOTOGRAPH

Apparently these Indian pictographs on the banks of the Rio Negro are old, but no guess has yet been made as to their meaning.



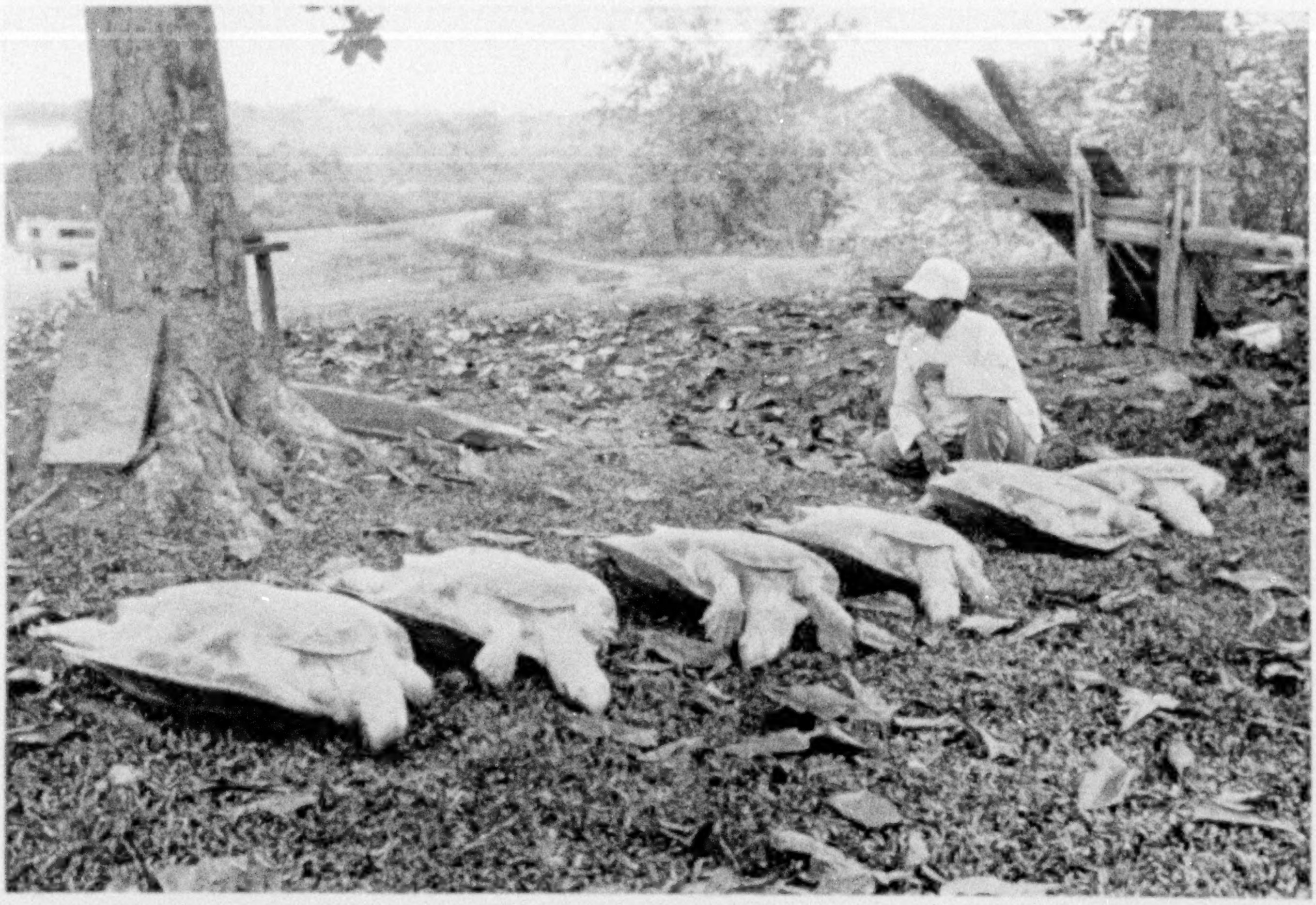
THE EXPEDITION'S STEAMER, THE "PARAHYBA," ON THE RIO NEGRO

Early in the morning the hydroplane usually flew up river for 100 miles, sketching and photographing; in the evening the steamer would arrive.



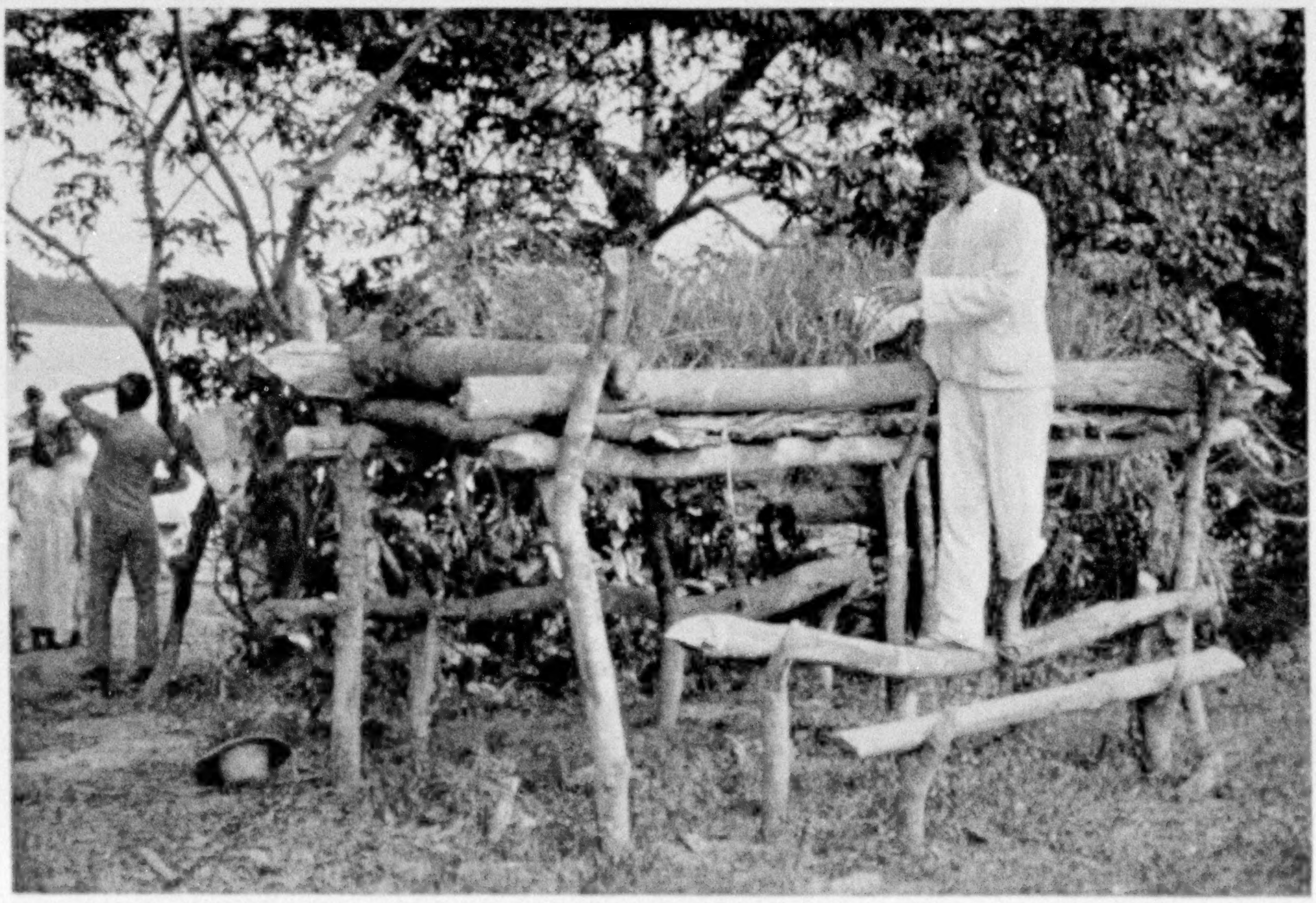
A CLOUD OF YELLOW BUTTERFLIES

In the Amazon Basin these lovely winged creatures often pack in a solid mass wherever a salty liquid has been spilled.



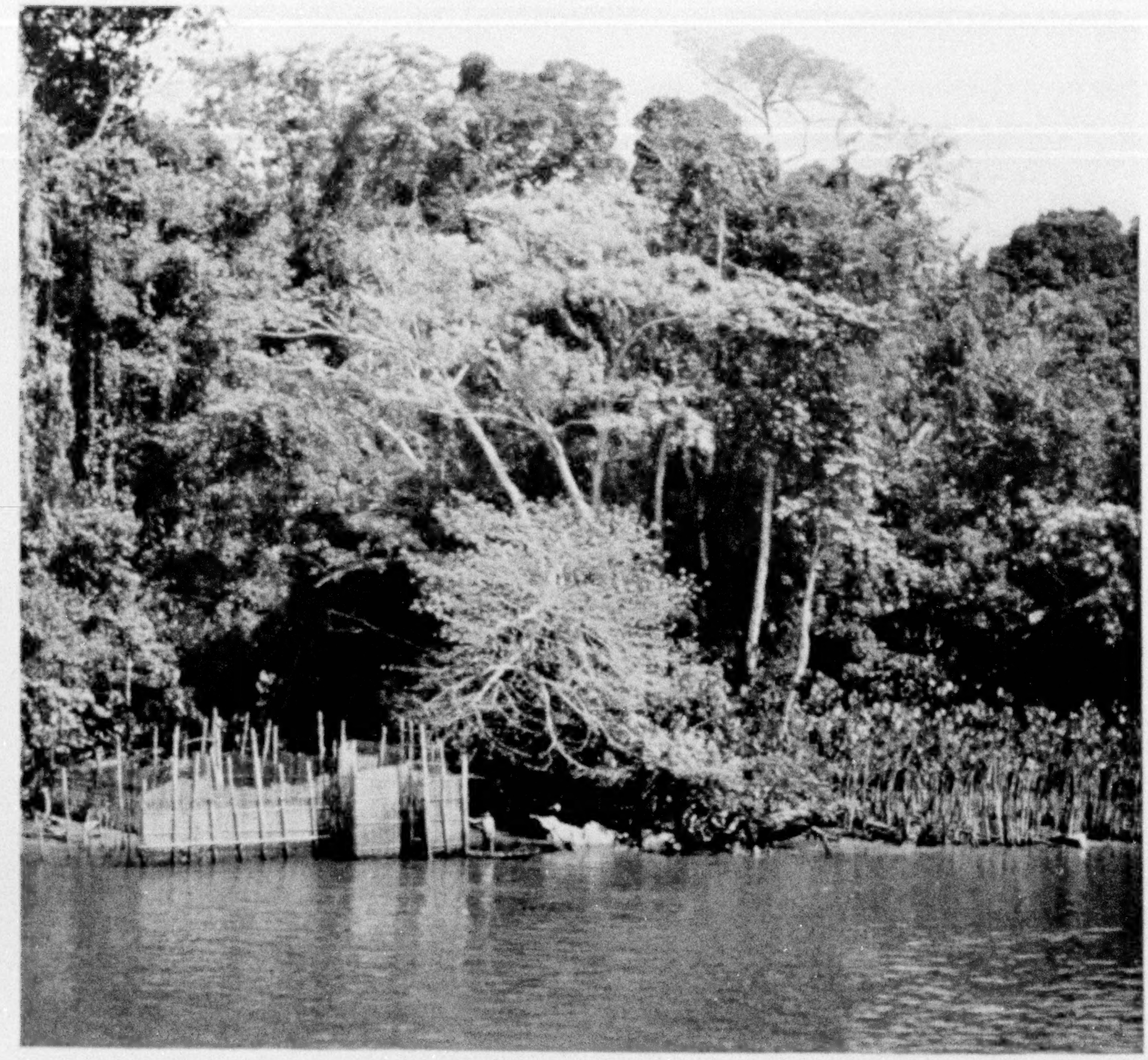
TURTLE SOUP IN THE RAW

These huge reptiles, caught in the Rio Negro at Carvoeiro, are to be shipped to Manáos.



A "HOTBED" ON STILTS

Not designed to protect the plants from frost, but from an excess of moisture, which at certain seasons of the year causes seed to rot before sprouting. The elevated platform enables the growing plants to receive plenty of sunlight and fresh air.



TURTLE PEN ON THE AMAZON

This is much like turtle pens that were seen elsewhere on the Negro and Branco, except that this one is some four times larger (see, also, page 362).

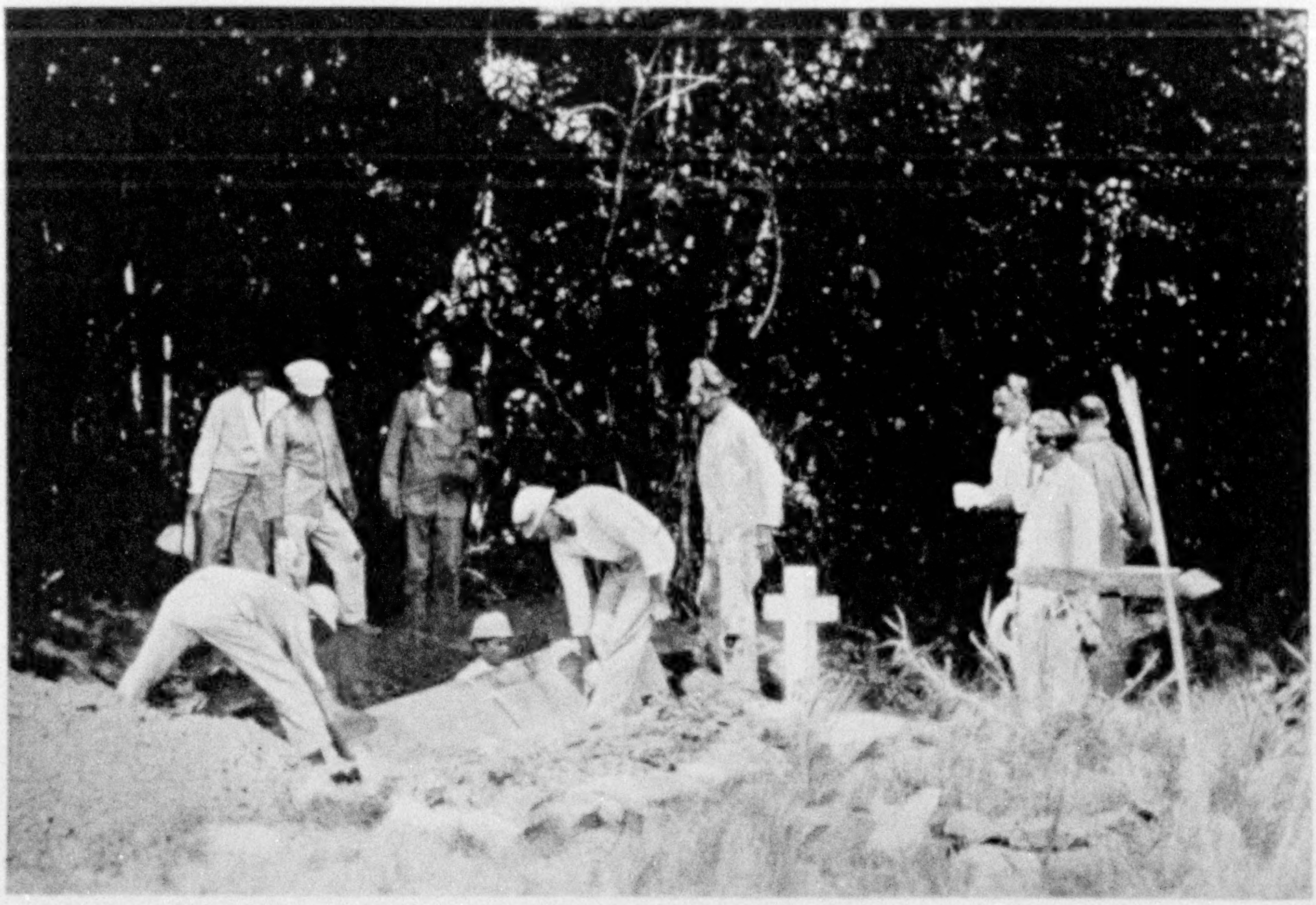
town rises Serra Grande, a lone mountain six miles long at the base and a welcome sight after the flat lands of the lower Amazon Valley.

The mountains on the Brazil-British Guiana border 75 miles to the east raise a low barrier to the northwest winds, which drop much of their burden of water on the tangled forests to the windward side of the ridge. West of this ridge, therefore, the great Amazon forest shreds out to grassy plains which provide a cattle range as big as the State of Vermont. Boa Vista is situated at the edge of this parklike *campos*, which enjoys a much drier climate than is to be found anywhere down river.

Here, free from the sapping effects of malaria, we were able to recuperate, to repair and paint the plane (page 384), and even to enjoy such a civilized pleasure as a dance. A "baile" was given by the senior soccer team to celebrate our arrival in the first plane Boa Vista had ever seen.

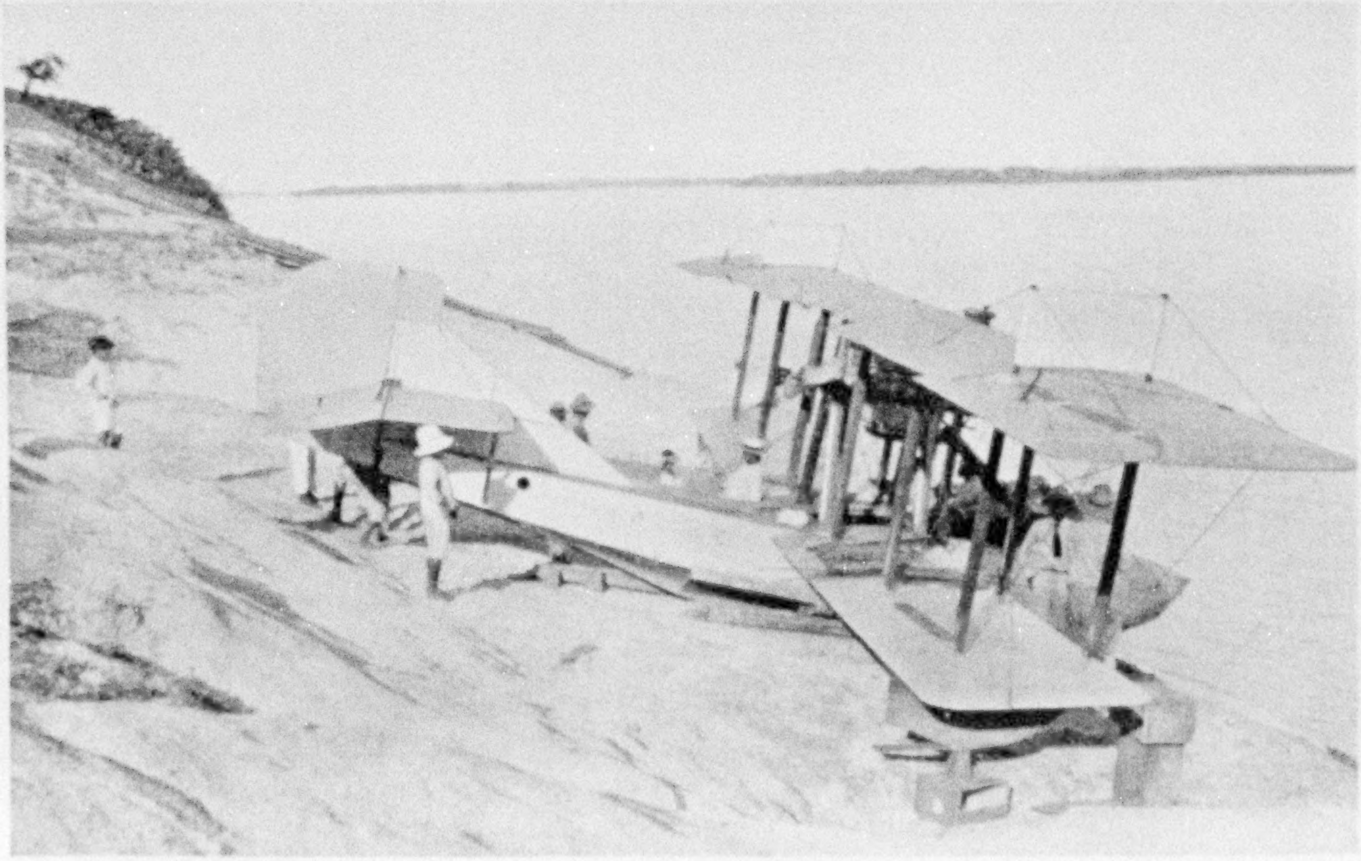
We were now on the fringe of a new frontier. Much in and around Boa Vista reminds one of bygone American frontiers. There are the scraggy, half-wild cattle driven in to be shipped down river, and there are open ranges where creeks alone serve as fences. The lariat is a conspicuous ornament and the horse reigns supreme, while a round-up is the year's great event.

In the town five Benedictines, reminders of Marquette and the Jesuits, were building, with their own hands and some Indian help, Boa Vista's first hospital.



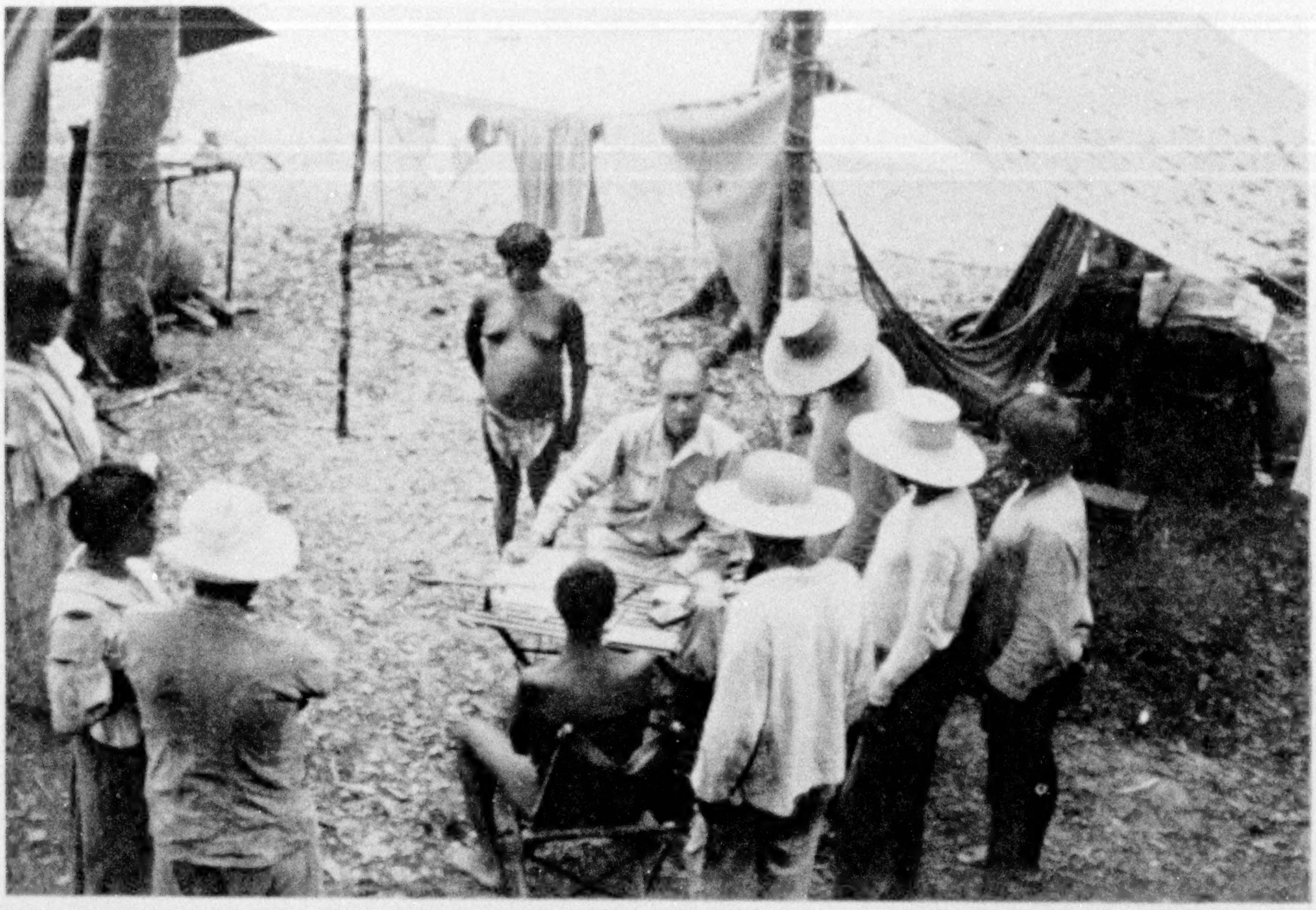
LOWERING DR. KOCH-GRÜNBERG TO HIS LAST RESTING PLACE: VISTA ALEGRE

An old explorer in this region, the jungle called him from Germany and finally claimed him (see text, page 377). To the right is the grave of an Englishman and the graves of Portuguese and Brazilians, most of whom had died of malaria.



IN "DRY DOCK" AT BOA VISTA: REPAIRING THE HYDROPLANE HULL

This was the best place on the Rio Branco for pulling out a plane, as there was a good slope, a clay bottom, and plenty of help to push the heavy machine well out of the water. The hull and fuselage were sandpapered and repainted and the wings patched wherever holes were found.



DR. SHATTUCK CONDUCTS A CLINIC IN THE JUNGLE

After the Indians have been given some clothes to protect them from insect bites, the physician examines them for tropical diseases. The ladies at the left, having just been garbed for the first time in their lives, look askance at their still naked sister.

Boa Vista was our base for three months.

On November 1 Hinton and I made an experimental flight up the Tacutu, an eastern tributary of the Branco, and on November 3 we flew 140 miles up the Uraricoera, to civilization's last outpost, the two-hut settlement of Boa Esperança, where the river divides to form Maraca Island, 50 miles long and 30 miles wide. This brought us out of the campos region and into the forest again.

At Caracarahy Rapids, between Vista Alegre and Boa Vista, gasoline and oil had been transshipped and carried as far as Boa Vista in launches, but beyond this point the rapids became so rough that we had to rely upon canoes to advance the hydroplane's fuel and lubricant. Sometimes we used a portable motor canoe and sometimes, particularly in the upper stretches, Indian rowers.

The gasoline was in five-gallon cans, which had to be carried around falls and the worst rapids. The heavy loads very nearly sunk the canoes more than once (see pages 406-407), and only 50 per cent of the fuel cargo taken on board at Boa Esperança ever reached the Parima-Aracasa junction, 250 miles upstream.

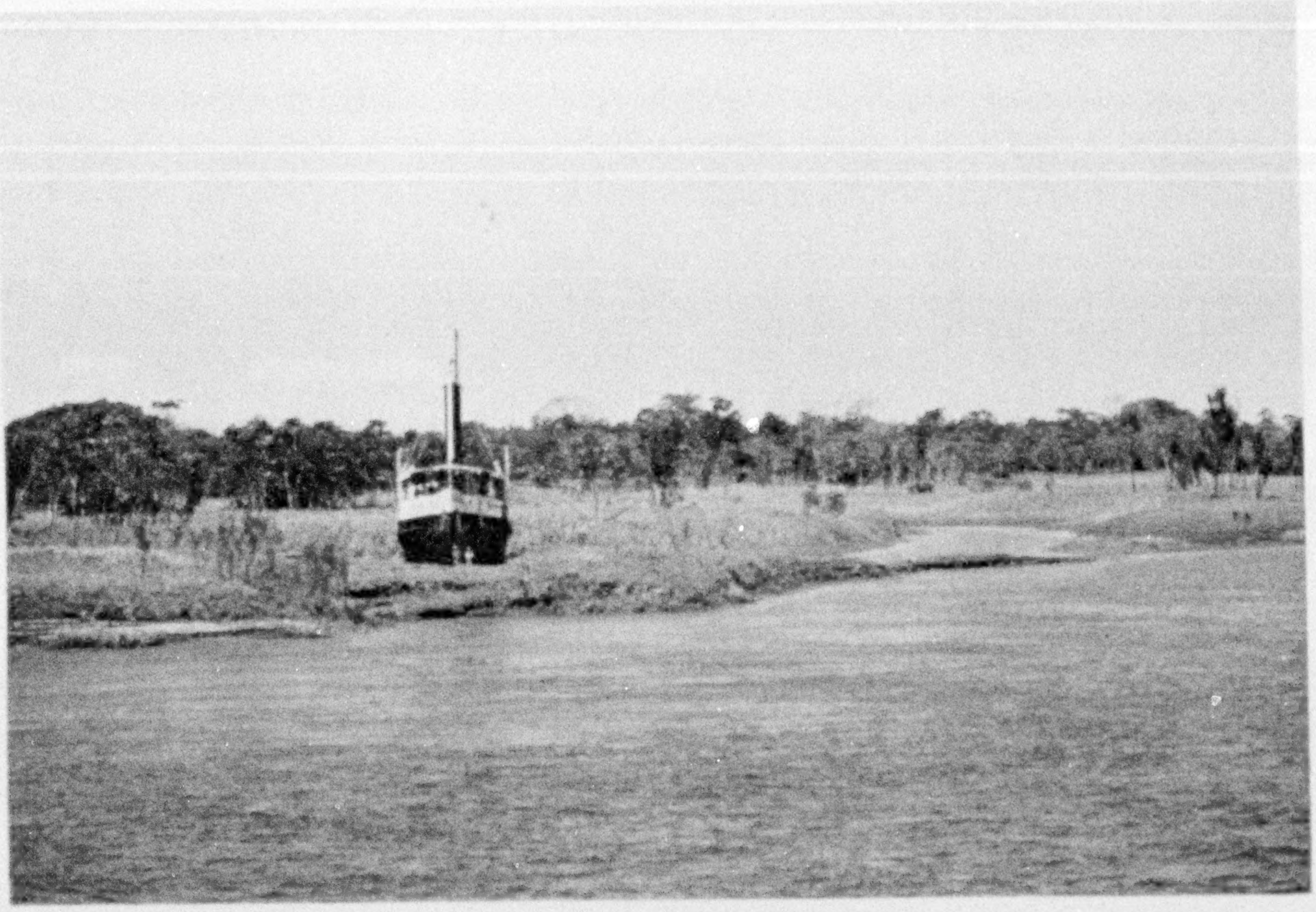
Up to this point the river had nearly always offered a landing place, but beyond Boa Esperança broad reaches had to be hunted. Sometimes we did not see smooth water for 90 miles at a stretch.

### FLYING OVER WILD JUNGLE

About 6:30 one morning we took off from Boa Esperança for a flight over the wildest country we had yet encountered. The jungle forced itself upon our consciousness now more than ever before, because there was no safe water below.

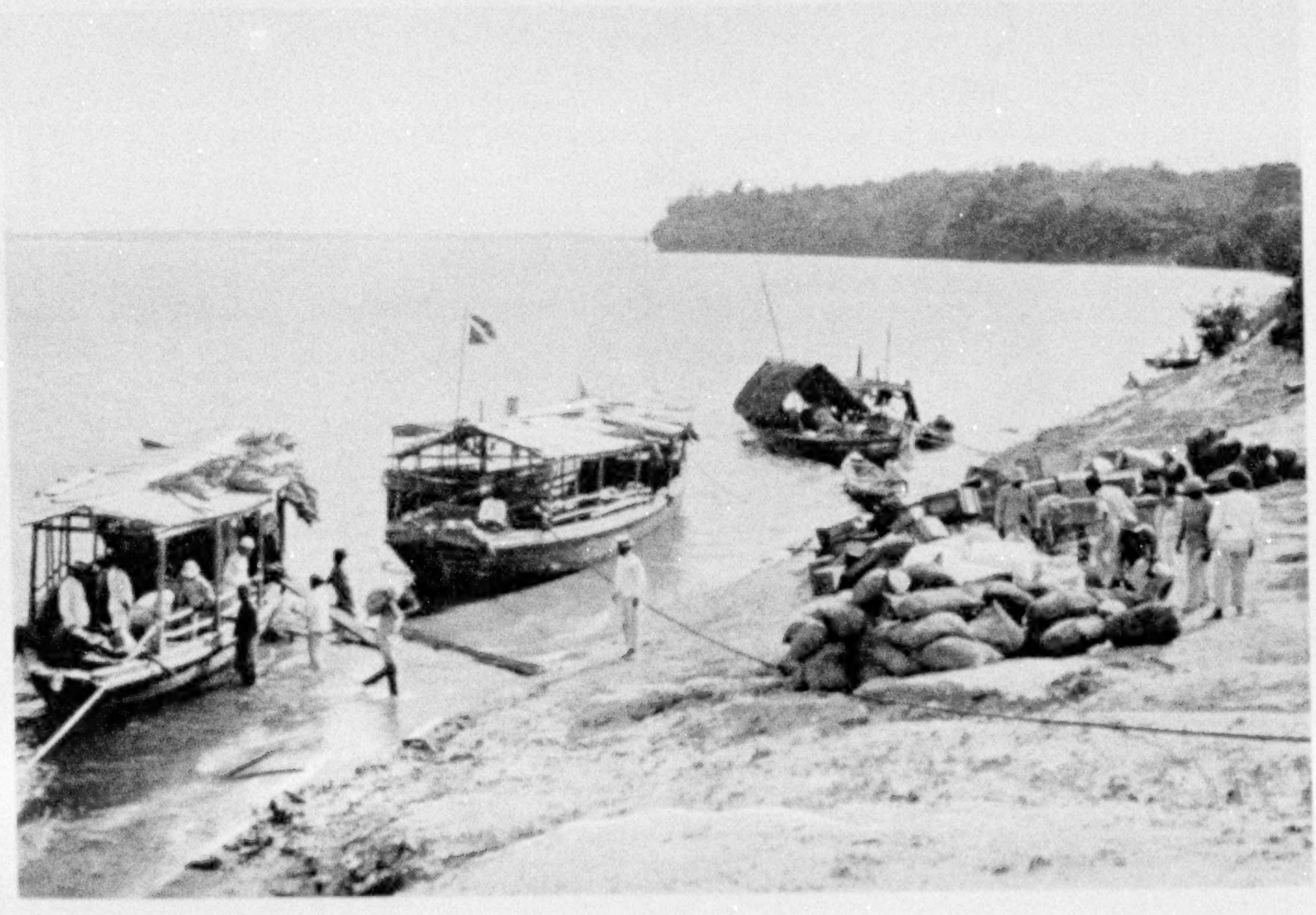
Those who have only a ground's-eye conception of a tropical forest think only of a high canopy of trees from whose branches hang vines and moss which spread their greedy fingers downward. Beneath this they conjure a picture of dense underbrush shrouded throughout the day in green twilight (see page 362).

We were privileged to view the jungle from the air, and so escaped from the moist, heavy atmosphere at the surface



WHEN THE WATERS RECEDED

The captain of this boat came down river when the Amazon was at high stage. He thought he was in the channel, but stuck on what apparently was a sand bank. The river dropped rapidly, and in two weeks he found that his steamer was really on dry land, and there to stay for another year, until the river should rise again.



UNLOADING SUPPLIES FOR THE EXPEDITION AT BOA VISTA

These stores had been transferred by launches from river steamers 100 miles to the south, at the Caracarahy Rapids, the head of navigation (see text, page 385).

JAGUAR HIDES

In the cattle country along the banks of the upper Rio Branco the calves attract many jaguars from adjacent patches of forest. The ranchers hunt the big cats with packs of lean, scrawny dogs whose chief asset is a terrifying bark. The jaguar climbs a tree, and the rancher comes along and shoots it down. The hides are valueless, as the fur is sparse, coarse, and short.

into a temperate region at an altitude of 5,000 feet.

Below us a sea of green billowed away over the low hills to a slender blue-black shore of mountains far to the west. From our elevation the palms scattered through the forest below looked like hundreds of starfish at the bottom of an ocean, their lighter green focusing in strong contrast against the dark tones of the jungle (see illustration, page 366).

At first we could pick out creeks, streams, and rivers, over a tremendous expanse of country, by the lines of thin white vapor hanging a thousand feet or less above them. Three-quarters of an hour later this vapor was burned off by the hot sun; but while it lasted it enabled me to get the compass bearings of many watercourses and to note them on our sketch maps.

From the head of Maraca Island the south channel of the Uraricoera divides into many narrow streams studded with islets and thickly spotted with rocks, over which the water pours in foaming white masses. Then comes a series of three cataracts, having a total drop of 80 feet, known as the Purumame Falls. Our supply canoes, which came on later, required from eight to sixteen days to pass this 40-mile stretch, over which we flew in 30 minutes! (see page 367).

Beyond Maraca Island the stream was still divided by jagged islets and outcropping rocks with angry rapids in the narrow channel. Not even the Indians seem to frequent this wild section. In three hours and ten minutes of flying we saw not a single sign of human life.

Having reconnoitered for landing places upriver, we returned to Boa Vista to wait until the expedition could push forward, as we could not outfly our gasoline and supplies.

### THE HYDROPLANE COMES TO GRIEF

It was not until January that we again took the air over the Uraricoera on what proved to be a most eventful trip. We swooped down to the surface of the river at a previously selected spot, called Ku-

BRAZILIAN GIRL OF THE "BEST FAMILIES": BOA VISTA, RIO BRANCO

leikuleima by the Indians and Kuleikuleima Rocks by us, intending to make further reconnaissance for the location of a supply base. Hinton made a perfect landing and was taxiing toward shore when suddenly there was the sound of splintering wood. The hydroplane careened, hung for a moment at a drunken angle, and then slowly righted herself. We had run onto a submerged pinnacle of rock!

The two layers of wood planking of the hull were only a quarter-inch thick; so that, weight for weight, the hydroplane's sheath was far thinner and more delicate than the shell of an egg.

It seemed probable that the plane was mortally hurt, and even if we succeeded in getting the craft to shore, it would be many weeks before our companions could reach us.

### A RACE WITH THE SUN

It was a time for quick decision. Hinton risked tearing away part of the hull and gave the ship "the gun." We rose from the river and headed toward Boa Esperança and safety, 150 miles away.

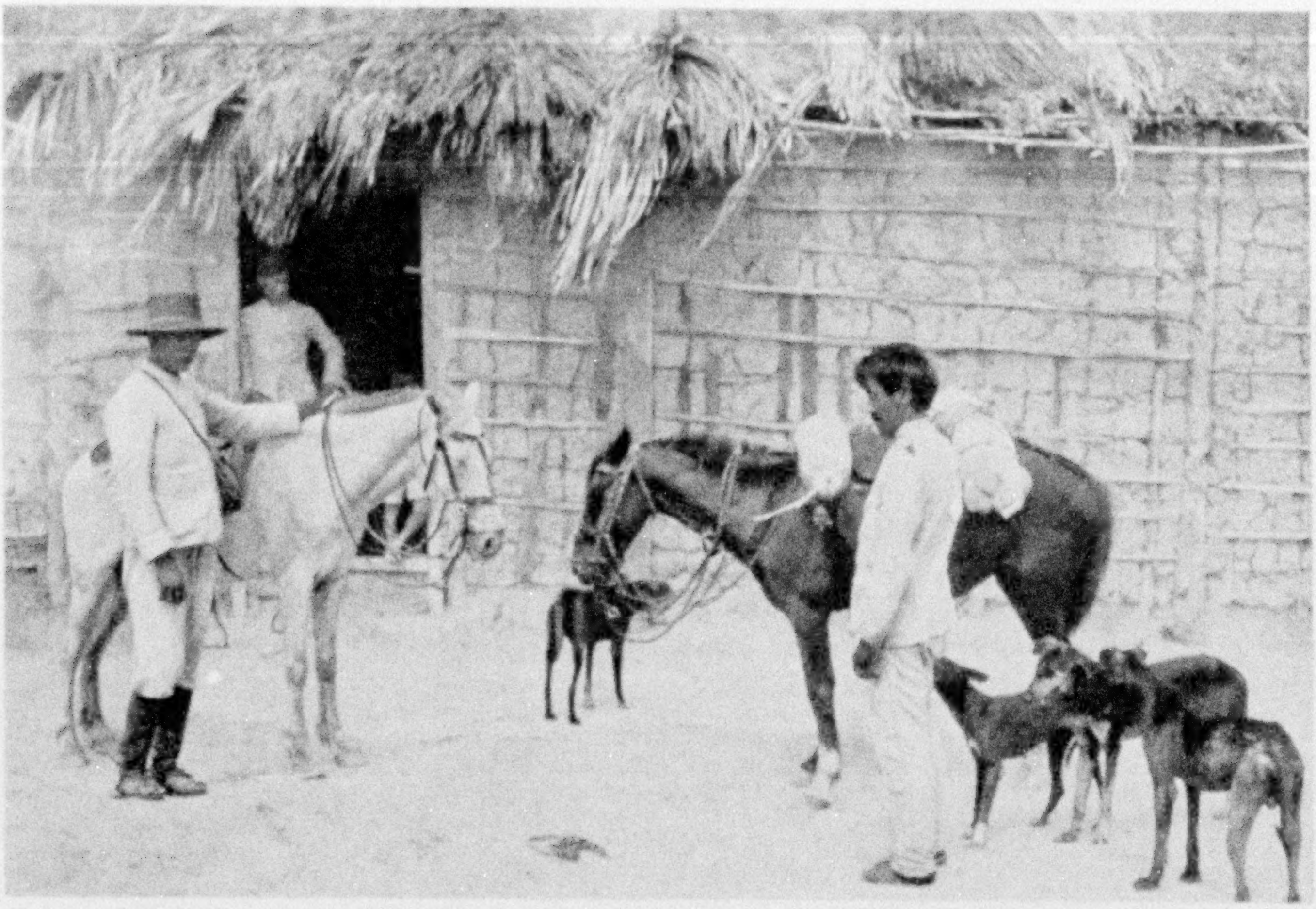
Our race was with the sun, for it was already late in the afternoon. Twilight began to settle as we came to Maraca Island, and Hinton turned the plane full speed down the north *furo* (channel). Darkness comes quickly near the Equator, and we soon realized that if we did not come down in a few minutes we would be flying over a dead-black jungle without a landmark to guide us.

With the prospect of a crash among the trees before us, there was no alternative but to descend. Three small islands came into view, the middle one flanked by a sand bar, and we decided this was the safest place to beach the plane. Down we dived to the river's surface, Hinton driving the plane as high up on the sand as possible.

When the plane came to rest, we climbed out of the cockpit to explore the jungle isle where we were to establish squatter sovereignty for eleven days.

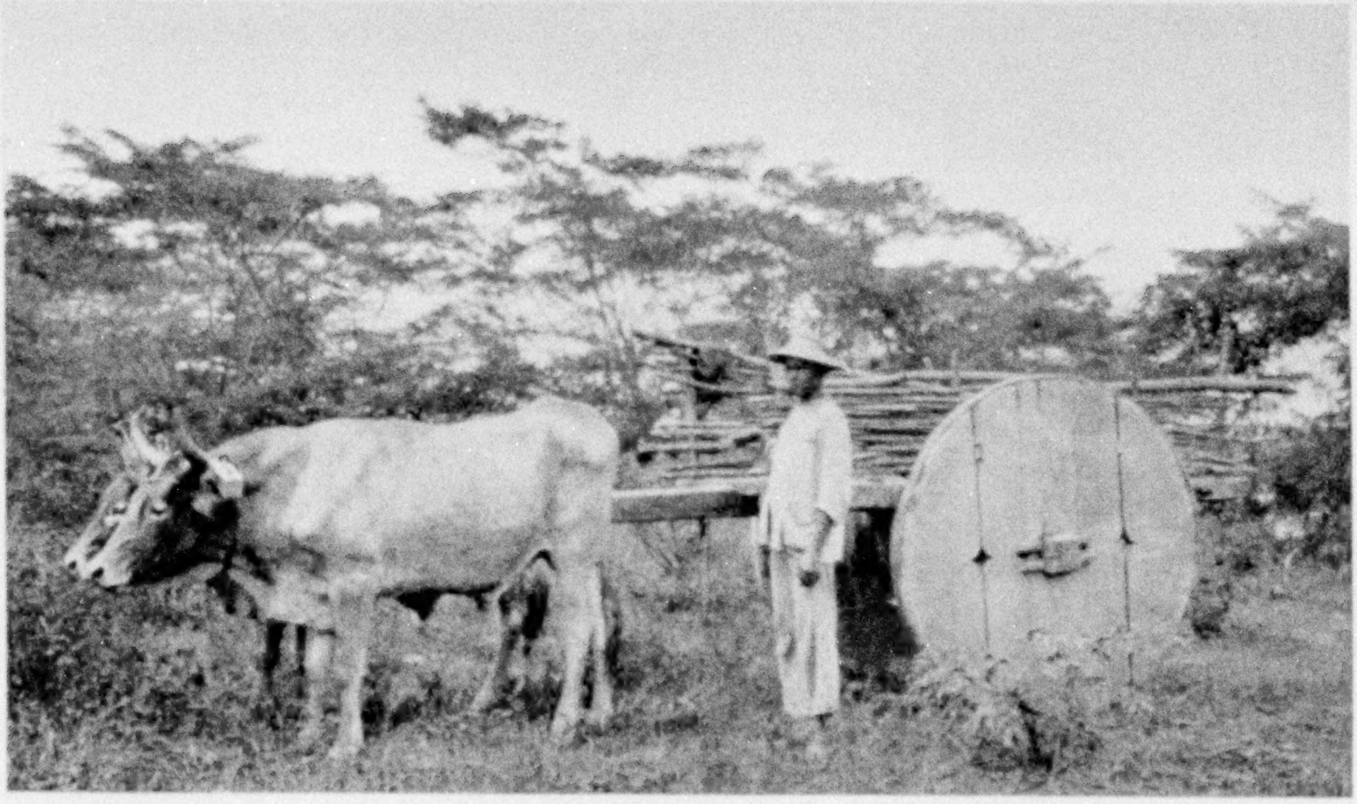
Our "Robinson Crusoe Island" was a mile long and a quarter mile wide, heavily forested with a great variety of trees, and apparently uninhabited.

Choosing the most likely spot for a camp, we stretched a cord between two trees for a ridge pole and suspended a canvas over it to make a shelter. Under this we hung our hammocks; for, like



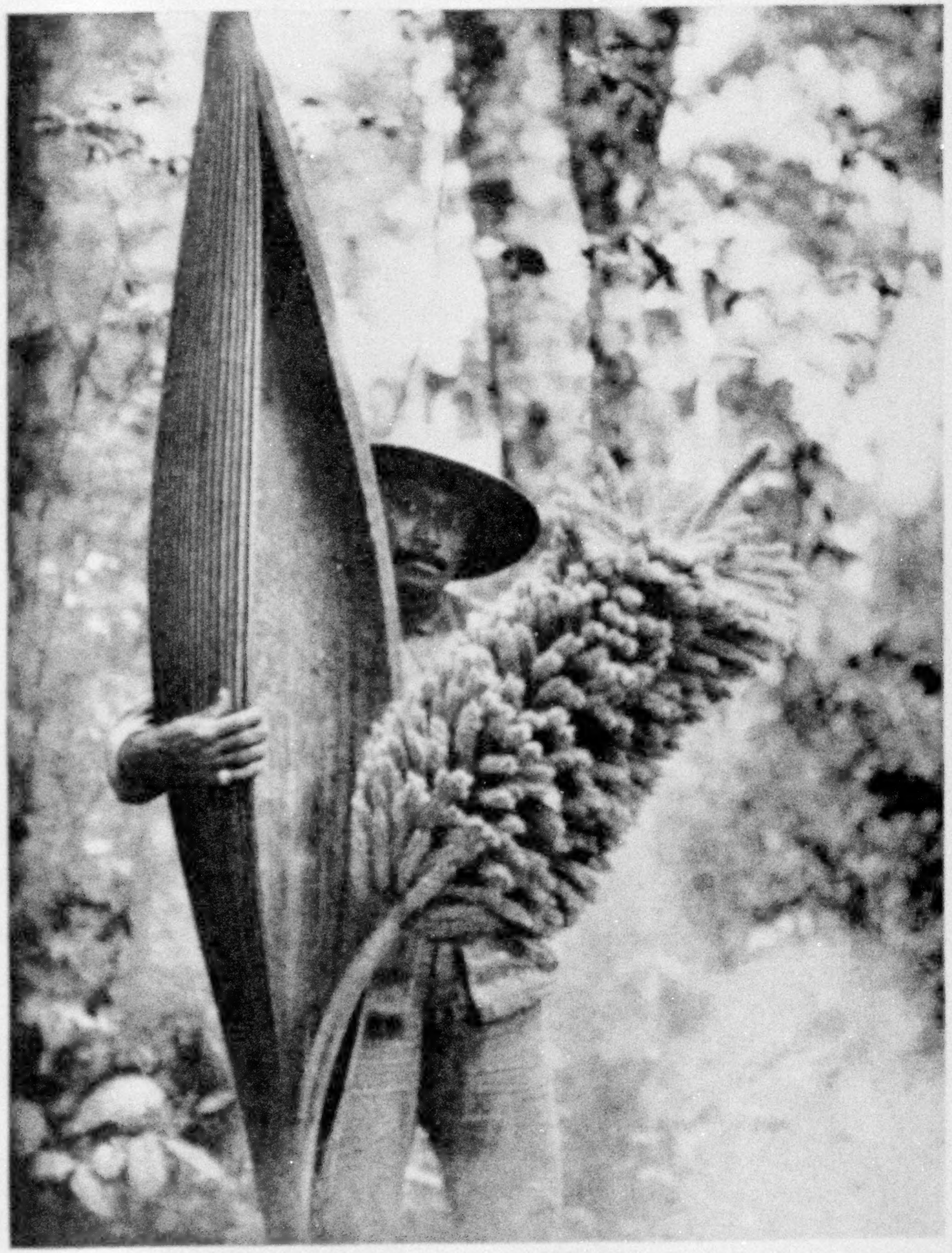
BEFORE A BRAZILIAN RANCHER'S HOUSE ALONG THE RIO BRANCO

Poles plastered with mud form the walls and the roof is a thatch of palm.



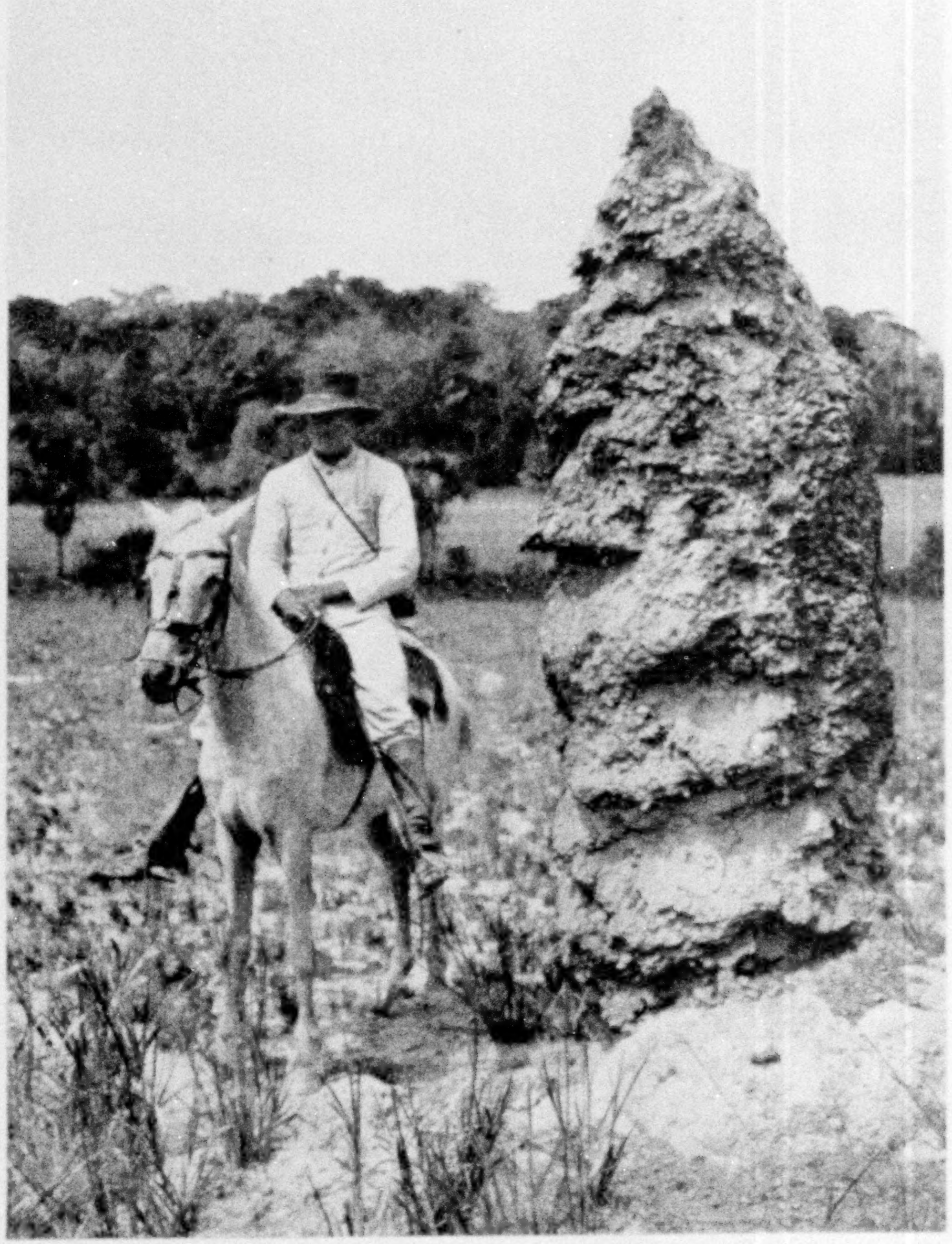
A STENTORIAN TEAM ON THE RIO BRANCO

The natives purposely refrain from greasing the axles of these carts, in the belief that the terrific screeching and groaning as the vehicle shudders along serve to encourage the oxen to greater effort. On narrow trails the noise warns other drivers of the approach of a conveyance which is extremely difficult to maneuver.



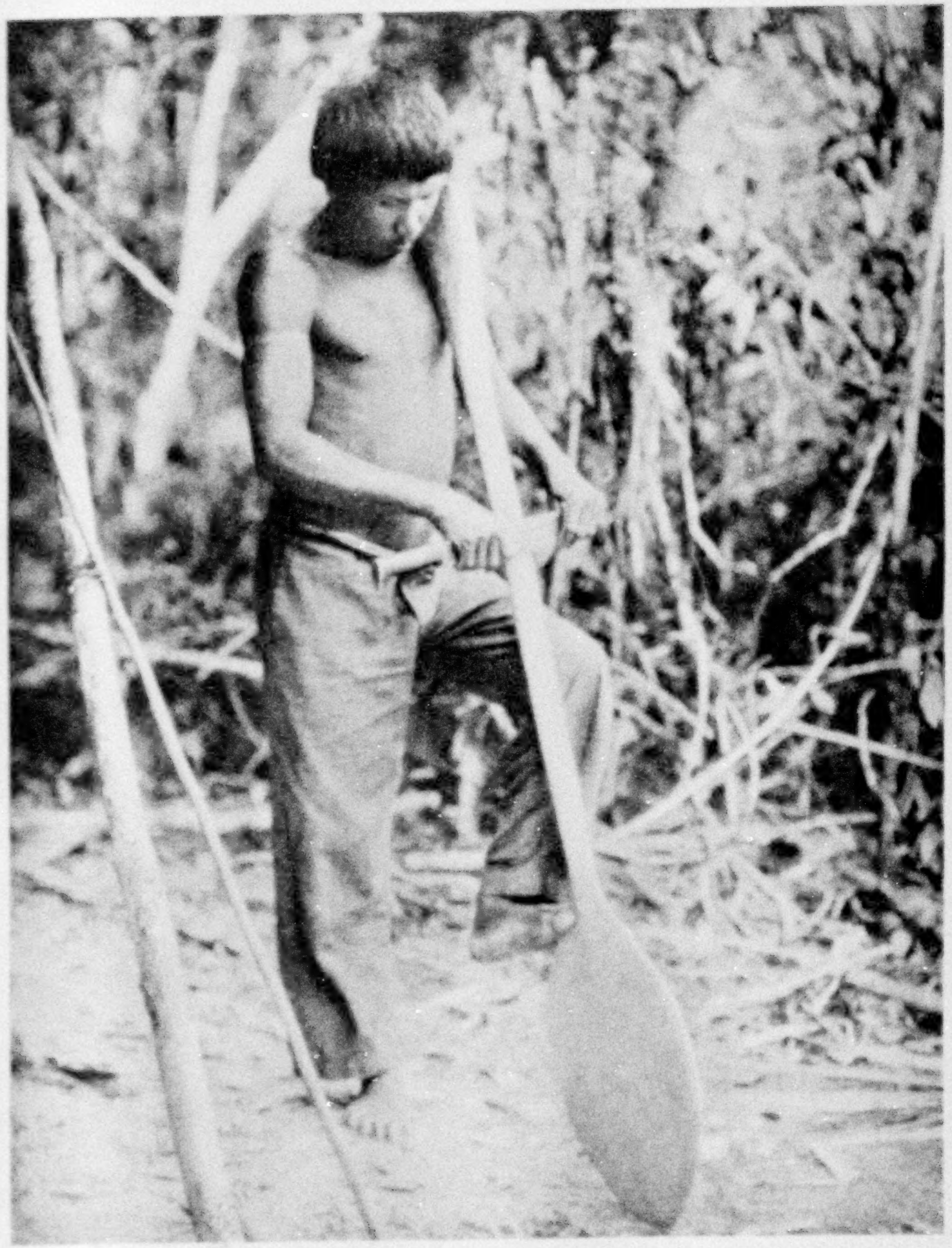
A PLUME OF THE JUNGLE

There is a curious fancy among the Brazilians that the palm tree defends this, its soul, which is "pointed to heaven." In time the husk breaks open, but in this case it was cut free and brought to the ground and split up the side with a knife to allow the plume to be seen.

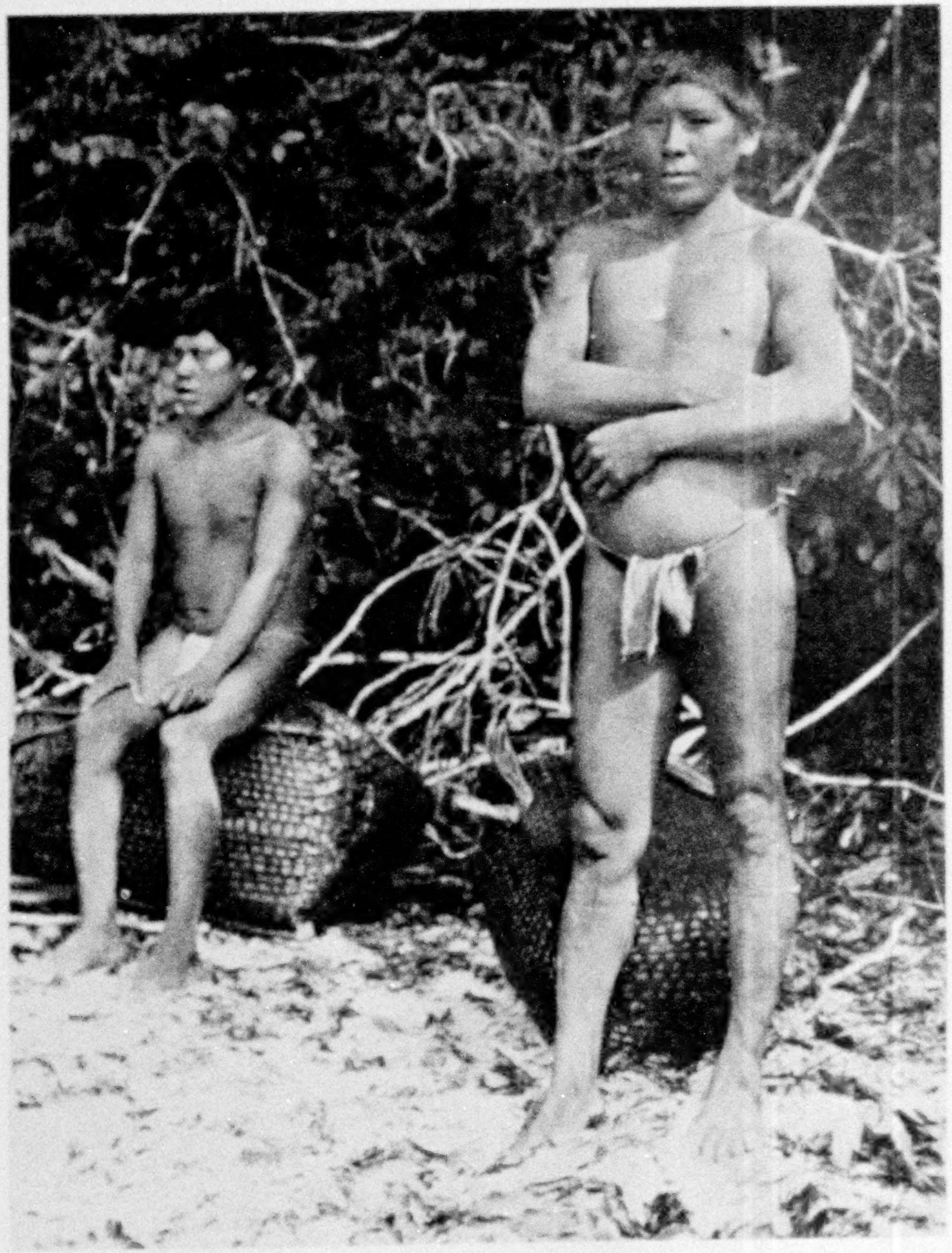


AN ANT HILL ON THE CAMPOS ALONG THE RIO BRANCO

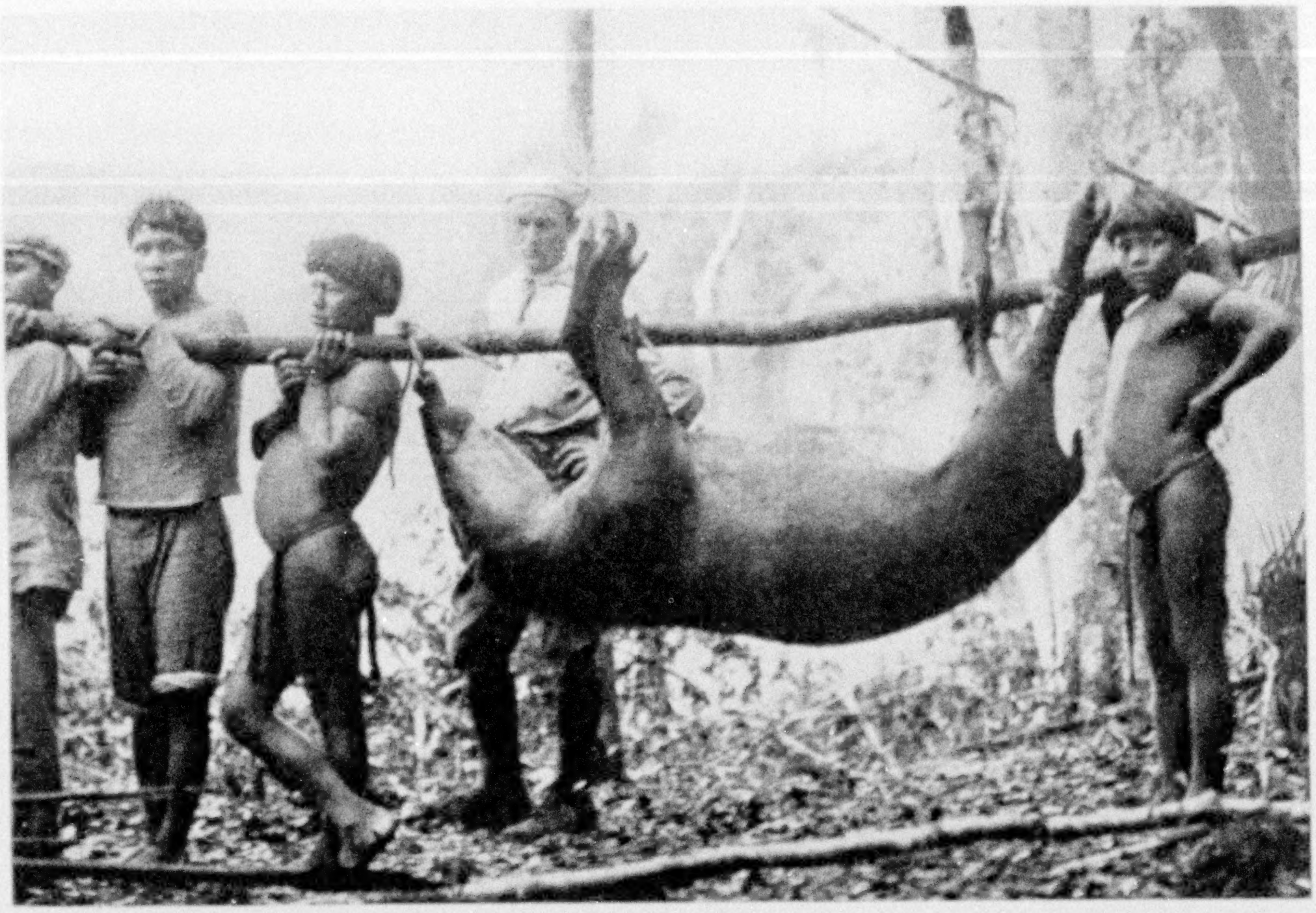
These huge, sun-dried clay heaps have the hardness of cement, and their vertical sides prevent the rain from soaking in. From a hydroplane the sight of thousands of these ant hills gives aviators the feeling of flying over a vast cemetery, the heaps appearing like tombstones.



BOTH FEET AND HANDS ARE EMPLOYED BY THE INDIAN CRAFTSMAN IN FASHIONING HIS PADDLE

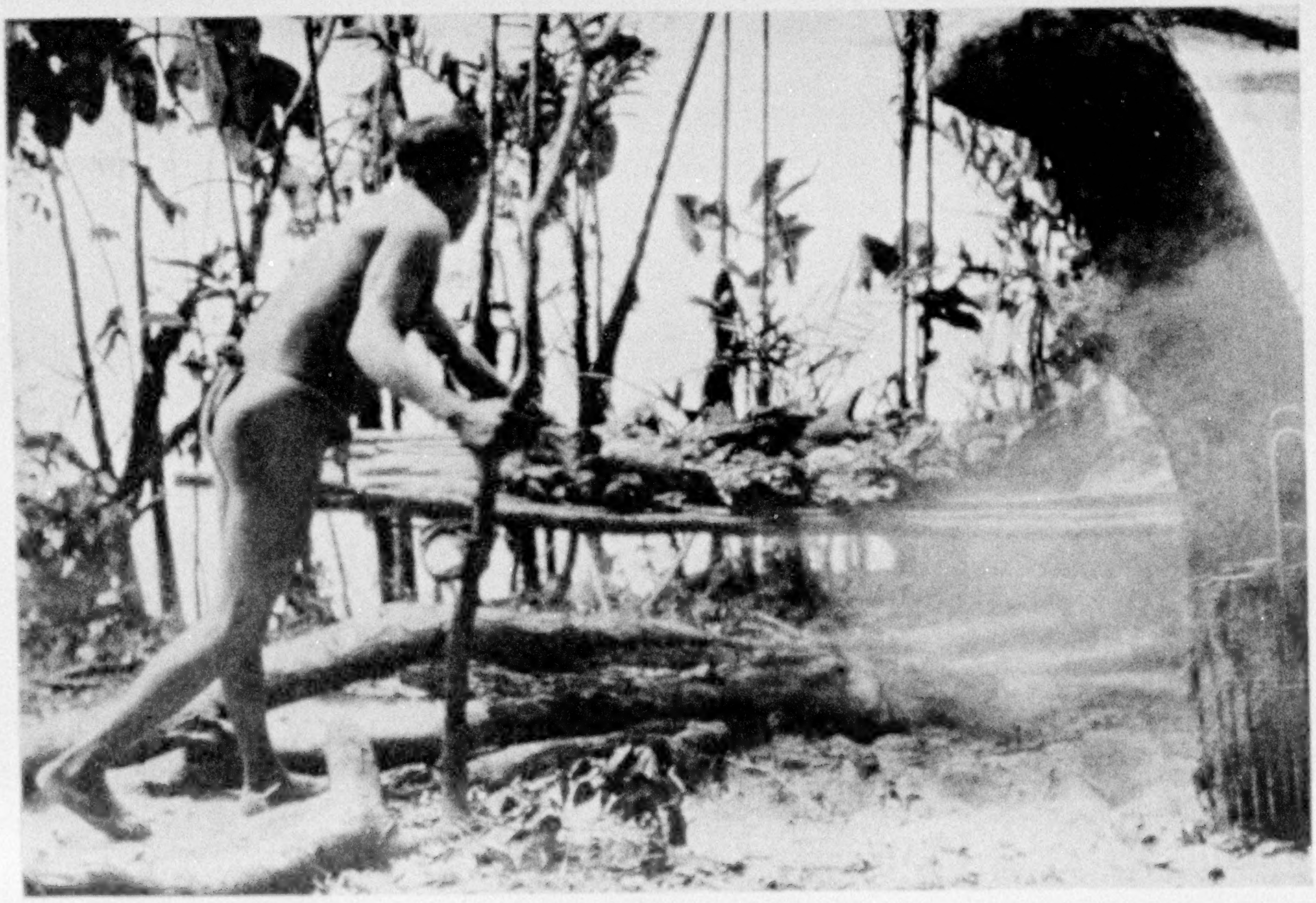


RESTING AFTER A HARD PORTAGE (SEE, ALSO, ILLUSTRATION, PAGE 416)



BEARING A 500-POUND TAPIR INTO CAMP

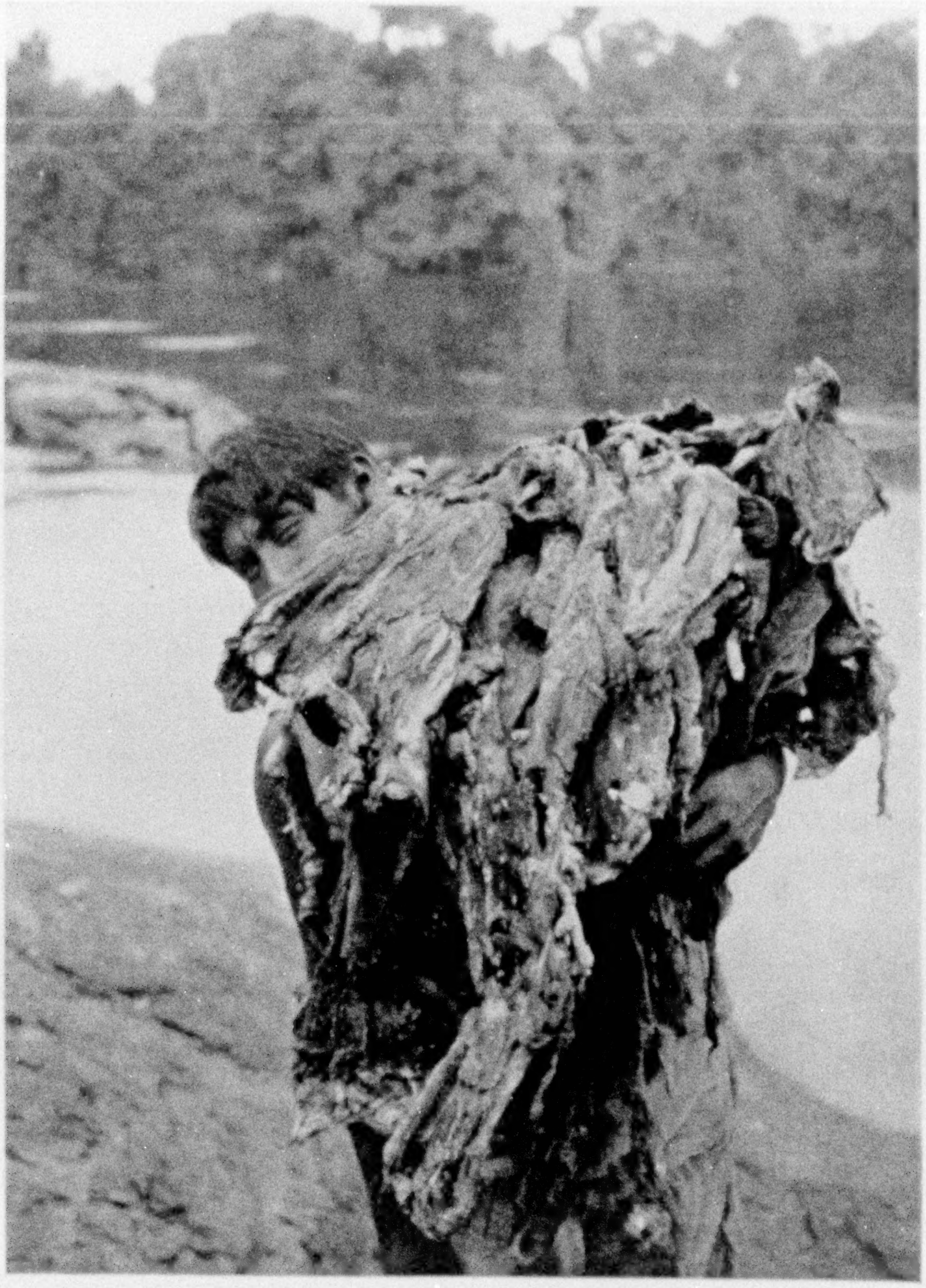
These animals were very common and provided the expedition's principal meat supply. The flesh tastes much like beef, although the animal resembles a pig to some extent.



AN AMAZON ABATTOIR

This native butcher is curing his tapir meat with smoke.

true sailors of the sea, navigators of the green jungle always sleep in hammocks. They are the universal Amazon bed for a very obvious reason—only a limited number of crawling insects can walk the two supporting tight ropes in one night. It is a problem of traffic. And we had learned that by creosoting the ropes we could set a "stop" signal on the crawlers.



HE HANGS HIS MEAT OUT TO DRY LIKE LAUNDRY

When a bundle of *carne secca* (dried beef) gets wet in the Amazon it soon sours. This Indian, staggering under a load of foul-smelling meat, is taking it to a point of rock where he will spread it out to dry and partly deodorize in the sun. This meat appeared for supper on several occasions later and was always recognized by its special odor and flavor, no matter with what else it was incorporated.

### OUR CAMP IS VISITED BY A MYSTERIOUS MIDNIGHT MARAUDER

The first night passed uneventfully, and next morning we started work on the hydroplane. With marine glue, canvas, and mahogany strips, which we always carried in the tail section, we were able to patch up the broken hull, for the damage was not serious. The big difficulty lay in getting the plane into the water again, for the river's level unfortunately had dropped while we were at work. Two men could not possibly move the plane; so there was nothing to do but cool our heels until the river should rise again.

About the middle of the third night on our jungle isle I was awakened by a hoarse whisper from Hinton:

"Steve, wake up."

"What's the matter?"

"Something's prowling around camp. Sounds like a great big animal."

Carrunch!

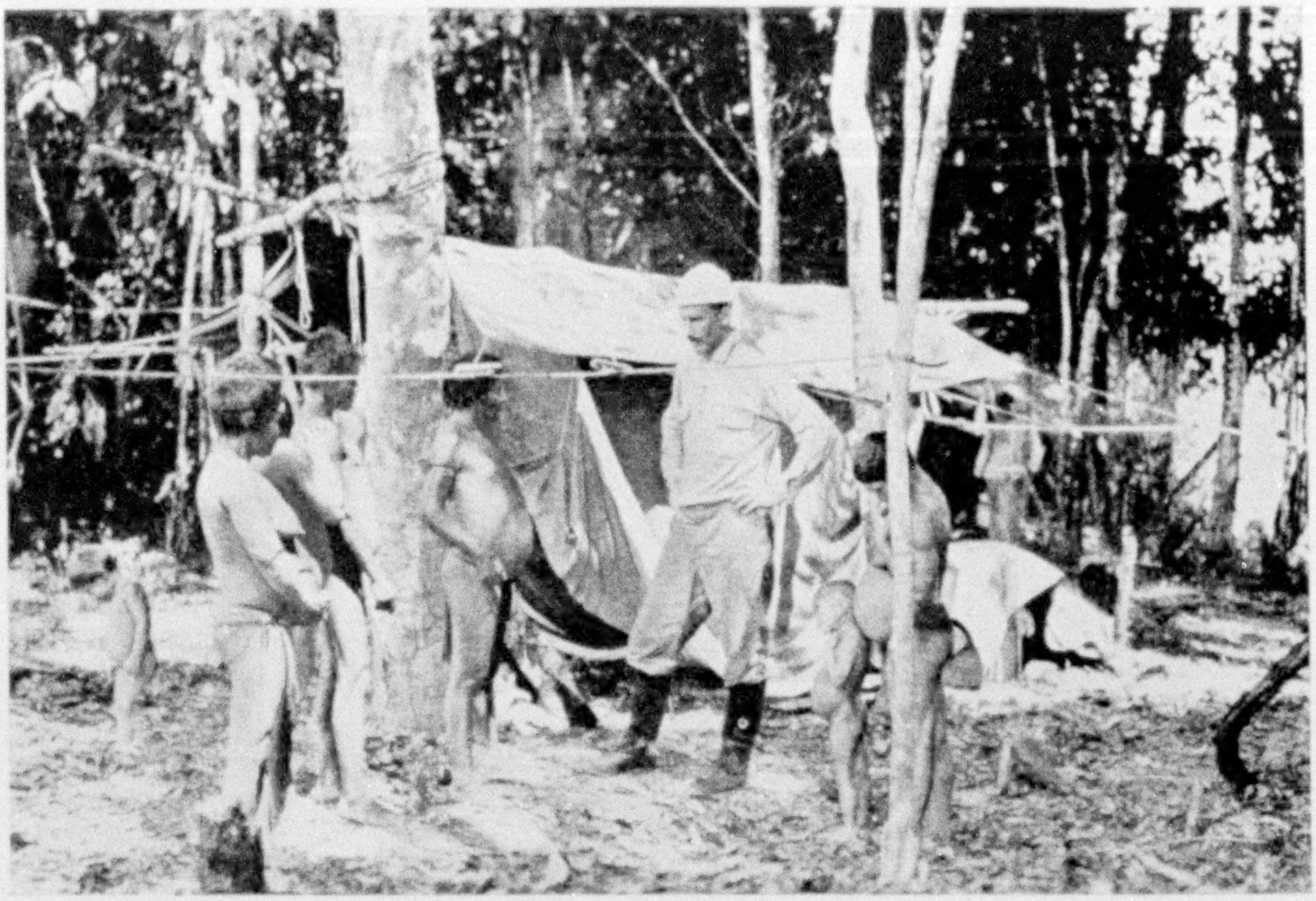
Walter was right! A ponderous, a loud, a threatening crunch!

Only a fitful light came from our camp fire, which we kept going all night to make the island seem less lonely.

Crunch! Crunch! Crunch!

"Sounds like an elephant," whispered Walter, and I agreed. By light of day both of us knew that elephants are not likely to be roaming about the Amazon Basin; but this was midnight, and big branches were breaking and trees were cracking on the other side of that fire!

We lay still for ages—listening. Then a strange swishing sound could be distinctly heard, as if some large creature



VISITED BY INDIANS AT THE ARACASA CAMP

The canvas fly served double duty for both Hinton and Stevens, and when it rained it was necessary to sling the two hammocks very close together, with the two occupants headed in opposite directions. The clearing was not natural, but was cut with hand ax and machete. These natives often appeared in camp without warning and noiselessly. One moment the camp would be empty, and the next, on looking around, it would be filled with a group of silent Indians.

were moving through the long grass. Surely no elephant would make a sound like that. It must be an alligator! I remarked as much to Hinton.

How far can an alligator reach with his jaws? The disquieting thought spurred me to action. I suggested that we get up and cinch our hammocks farther off the ground.

This we did, and, once on our feet, both courage and curiosity began to assert themselves. I dug out my flashlight and a revolver too small to be useful. Meanwhile a medley of crunching, snapping, and swishing sounds continued to break the stillness of the night. Neither of us was inclined to wait passively to be devoured by some unknown beast, so we decided to meet the monster.

Armed additionally with an ax and a machete, we wormed our way toward the noise. I turned the flashlight into the black jungle. We could see nothing, but the sounds grew closer.

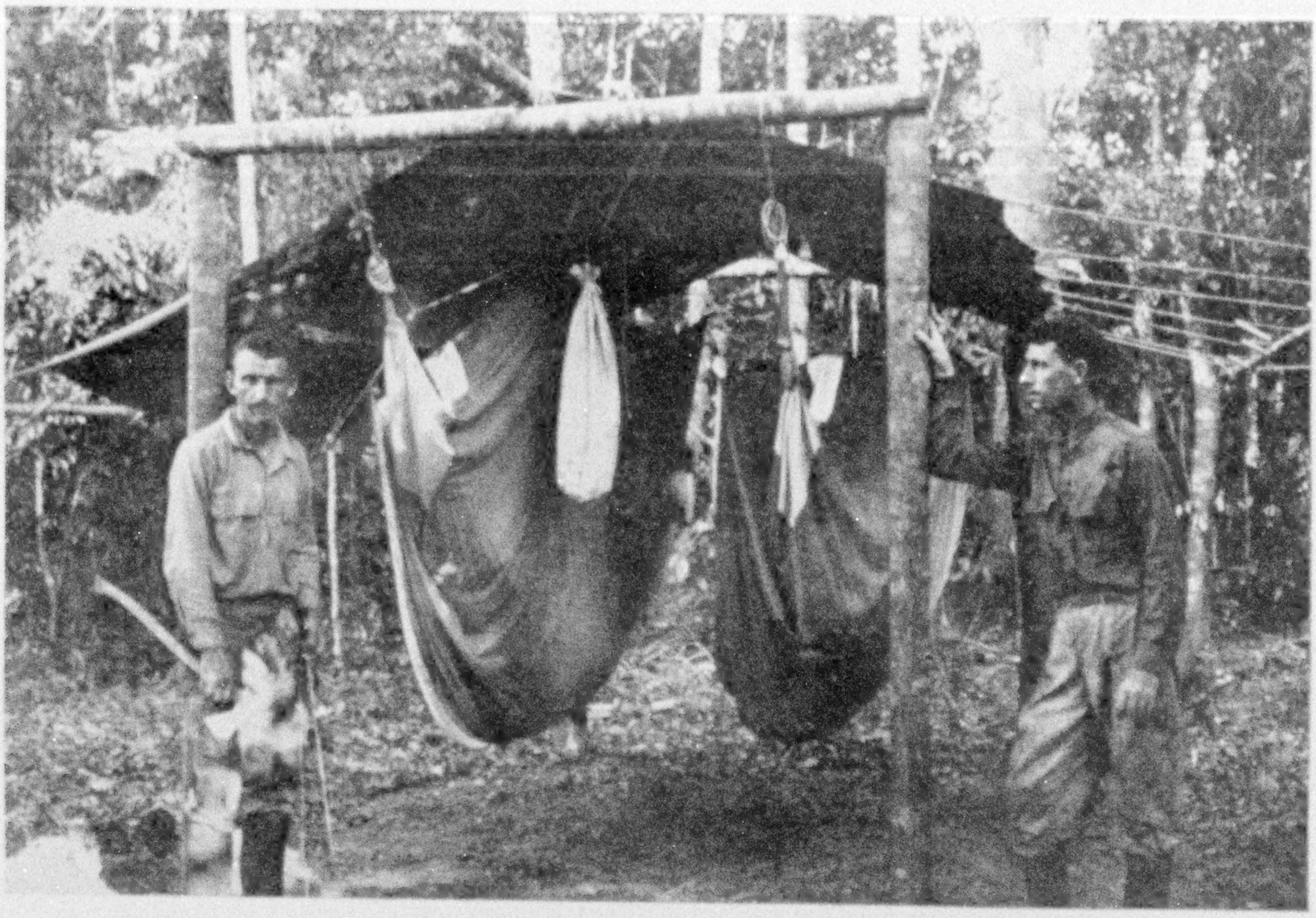
All at once a terrific crash resounded in the dark. Trees shivered, limbs gave way, and some large animal made off into the forest at full speed, bumping trees and breaking things right and left in its mad flight. For some time we could hear it tearing through the jungle.

Although we were still unenlightened as to the identity of our guest, it was at least comforting to know that he was of a retiring disposition, and after his departure we managed to get to sleep again.

By morning light we examined the scene of our night's adventure and, finding hoofprints much like those of a cow, we came to the conclusion that all the commotion had been caused by a tapir, that queer but harmless animal, with both swinish and bovine characteristics, the largest quadruped of the Amazon jungles, sometimes weighing as much as 500 pounds (see page 392).

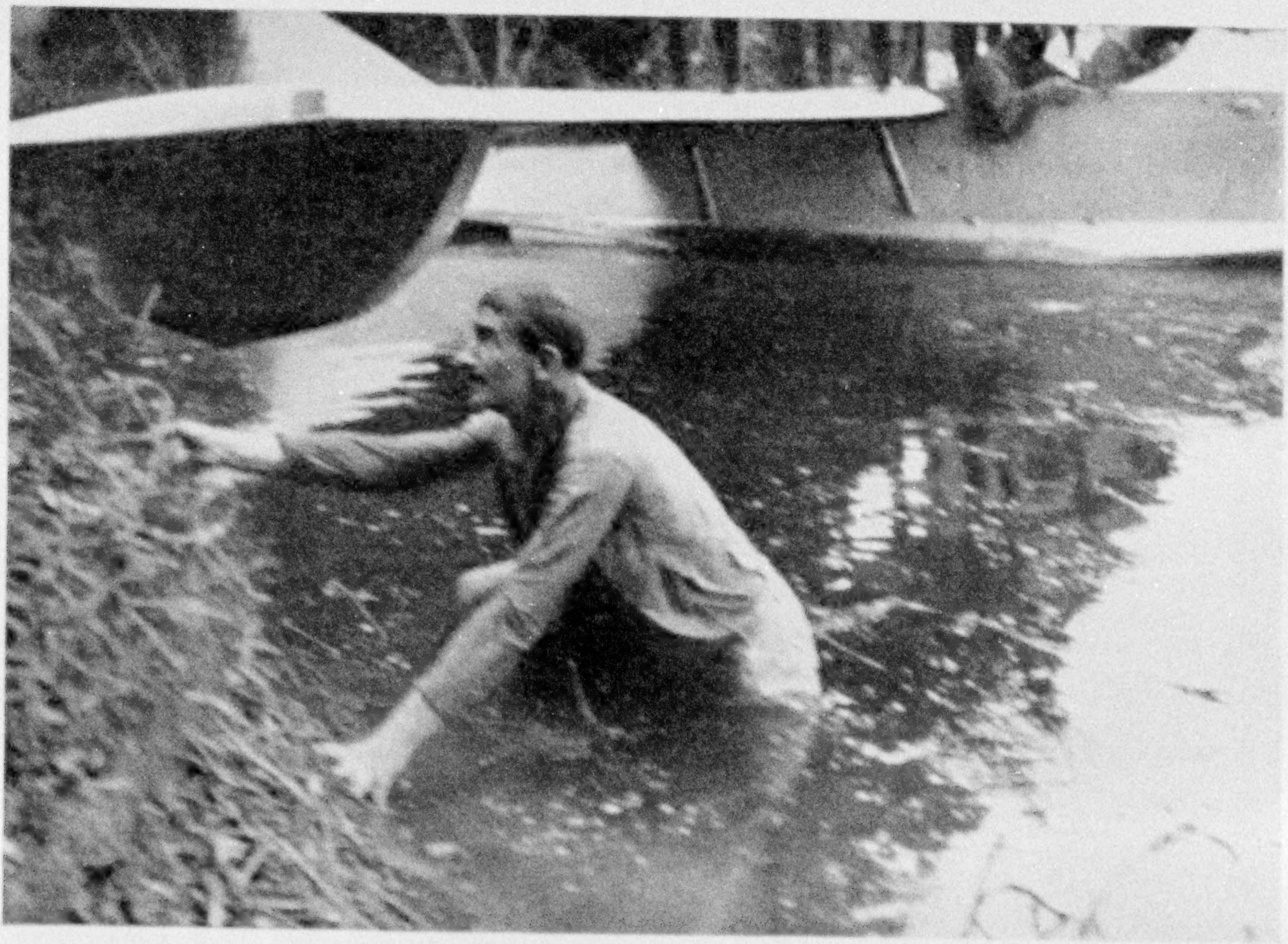
## INDIANS ARE ENTERTAINED

Two days after the tapir episode we entertained other visitors. Four Indians,



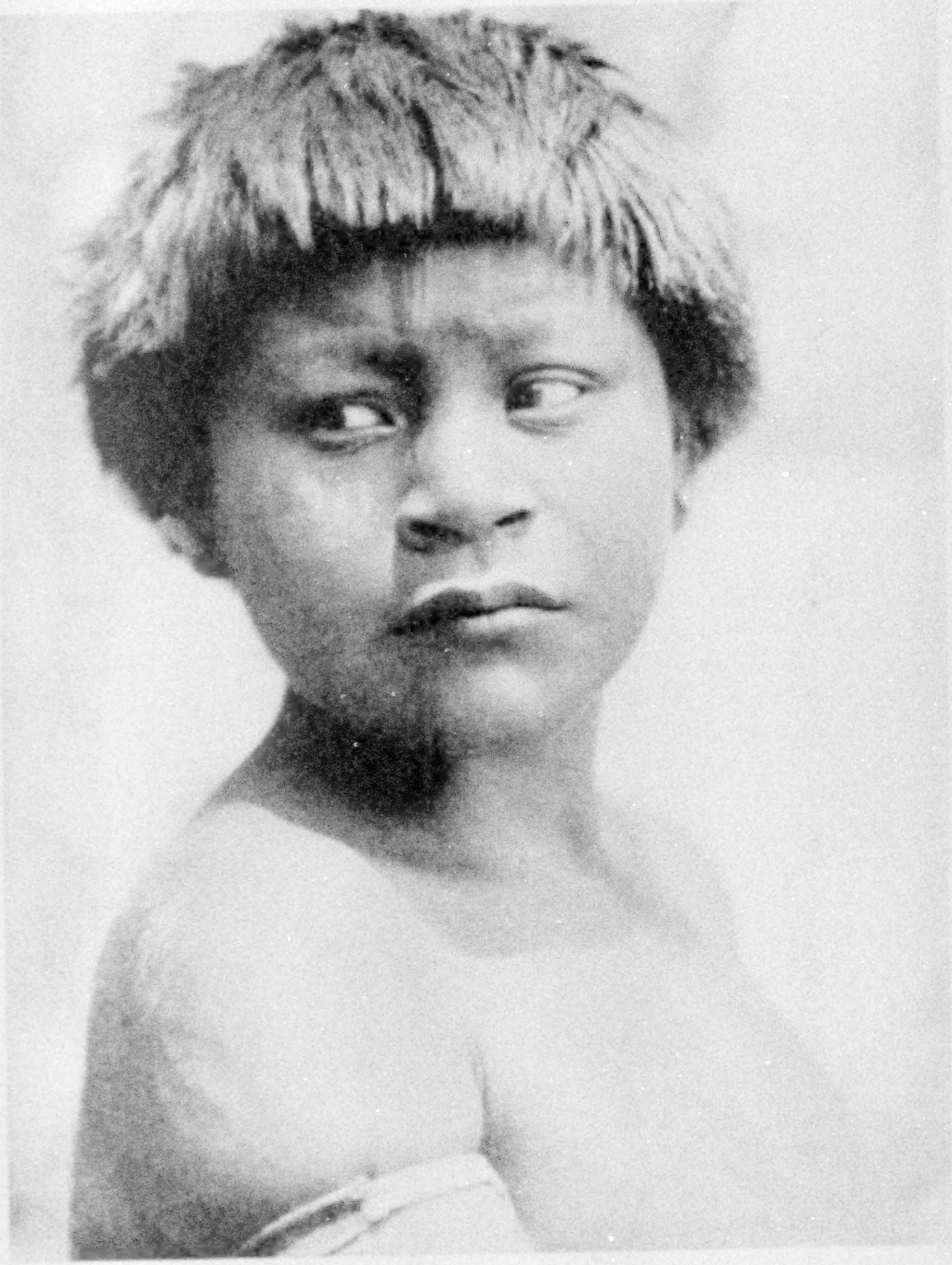
TWIN BEDS IN THE TROPICS

"Home, Sweet Home" in the Brazilian forest—two hammocks and one fly. The camera was tripped with a piece of thread (Stevens left, Hinton right).



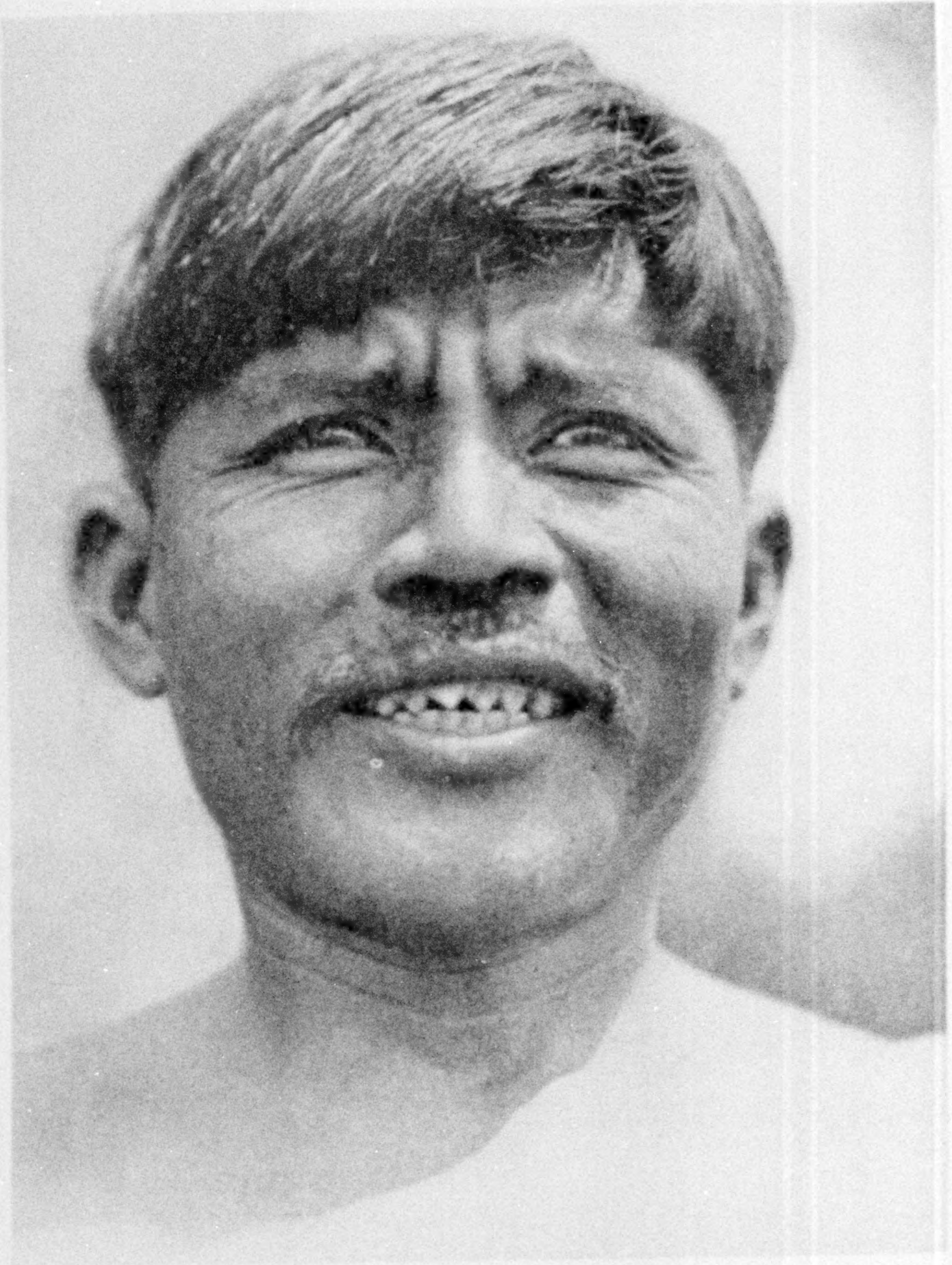
PURSUED BY PIRANHA

Hinton and Stevens flew together practically all the time, but on a few occasions the plane was used to ferry a passenger down river. Then it was necessary for Stevens to start the motor, dive overboard, and swim ashore, as it was impossible to return to shore any other way, once the propeller was in motion. Dr. Rice made this picture of the swimmer scrambling up the muddy, vine-covered bank before some sharp-toothed fish should nip him in the ankle.



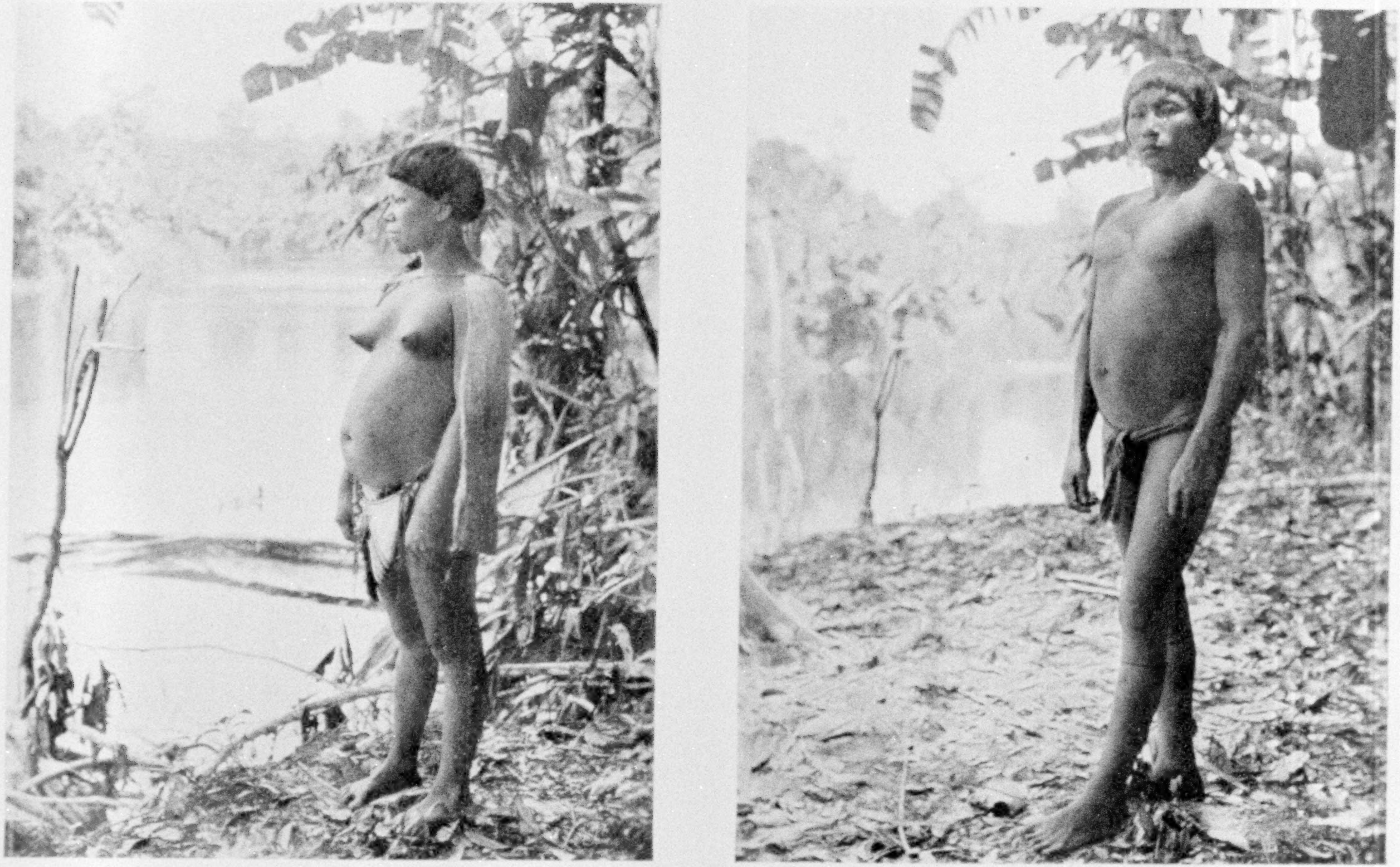
A MAYONGONG YOUTH

The well-defined constriction on his upper arm shows that the binding began almost in his infancy (see, also, illustrations, pages 398 and 411).



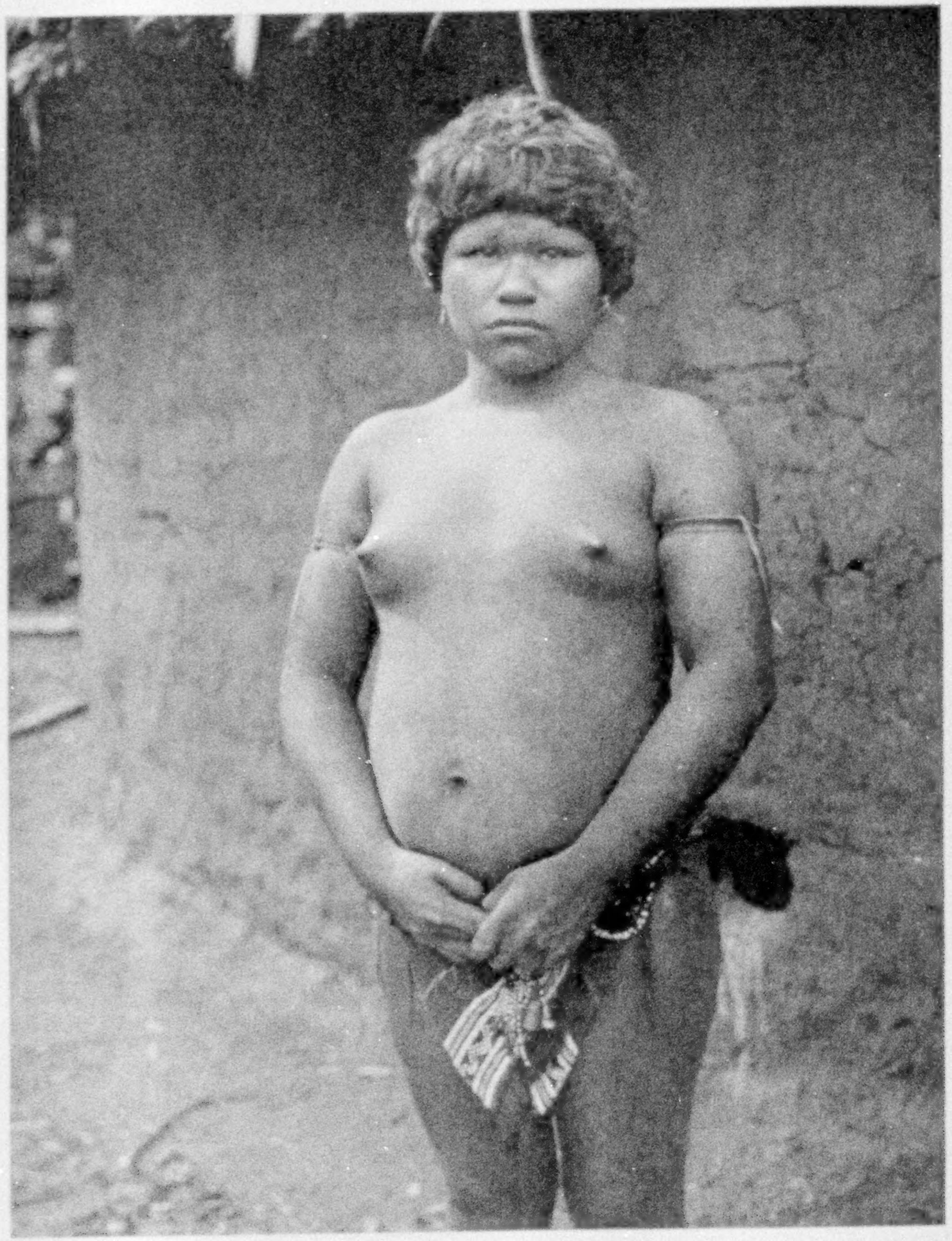
EACH MAN HIS OWN DENTIST ON THE UPPER URARICOERA

This native has filed his teeth to the sharpness of a piranha's (see text, page 377) in the belief that thereby he is preventing their decay.



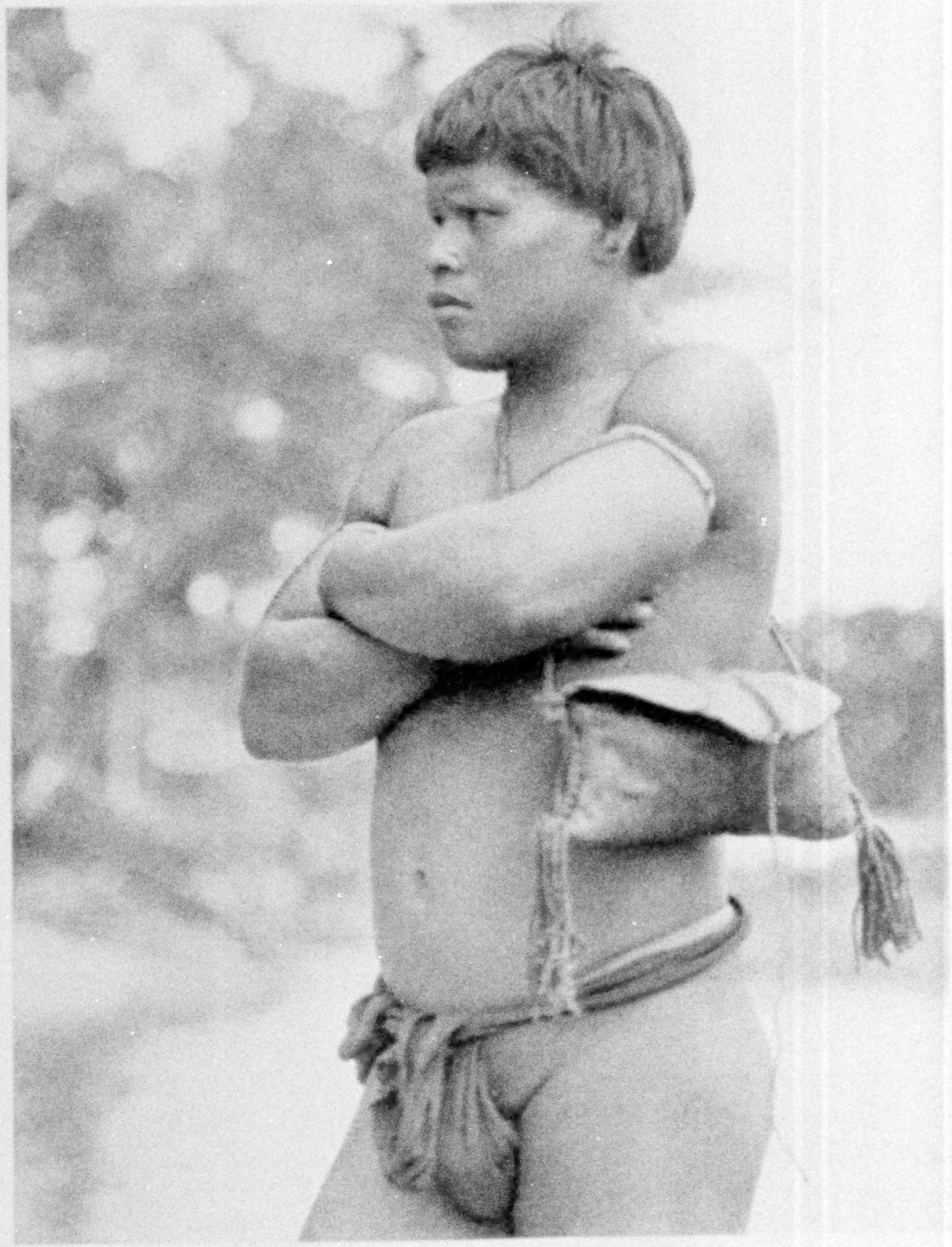
A MAKU SQUAW AND HER HUSBAND: PARIMA RIVER

There is little in their costume to distinguish the men from the women in this tribe; they even affect the same style of hair "bob." The woman has decorated her shoulders with an old piece of cloth for the occasion of having her photograph taken.



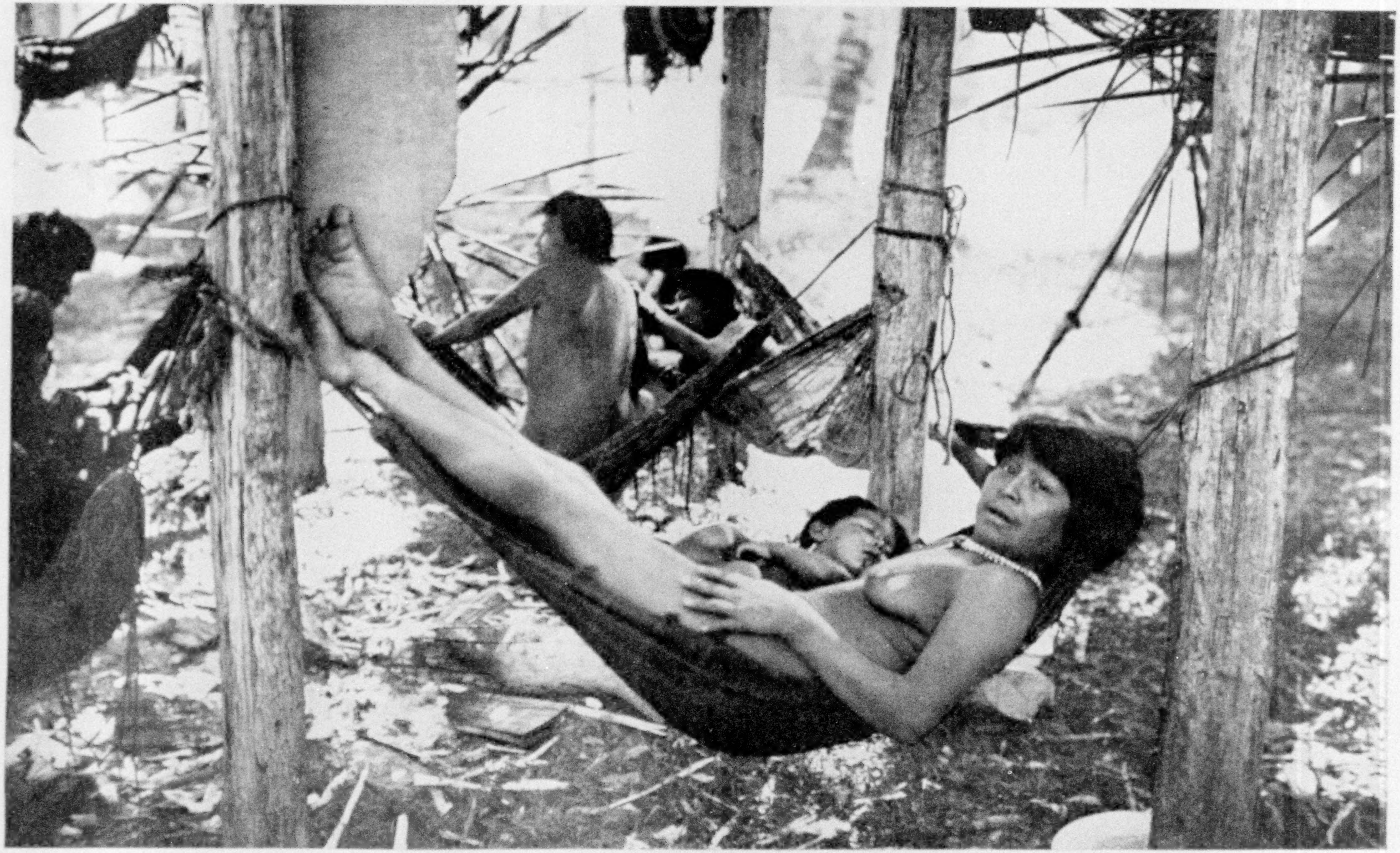
A BELLE OF THE RIO PARIMA

This Maku Indian maiden has been diverted momentarily from her occupation of preparing farinha (see illustrations, pages 414 and 415).



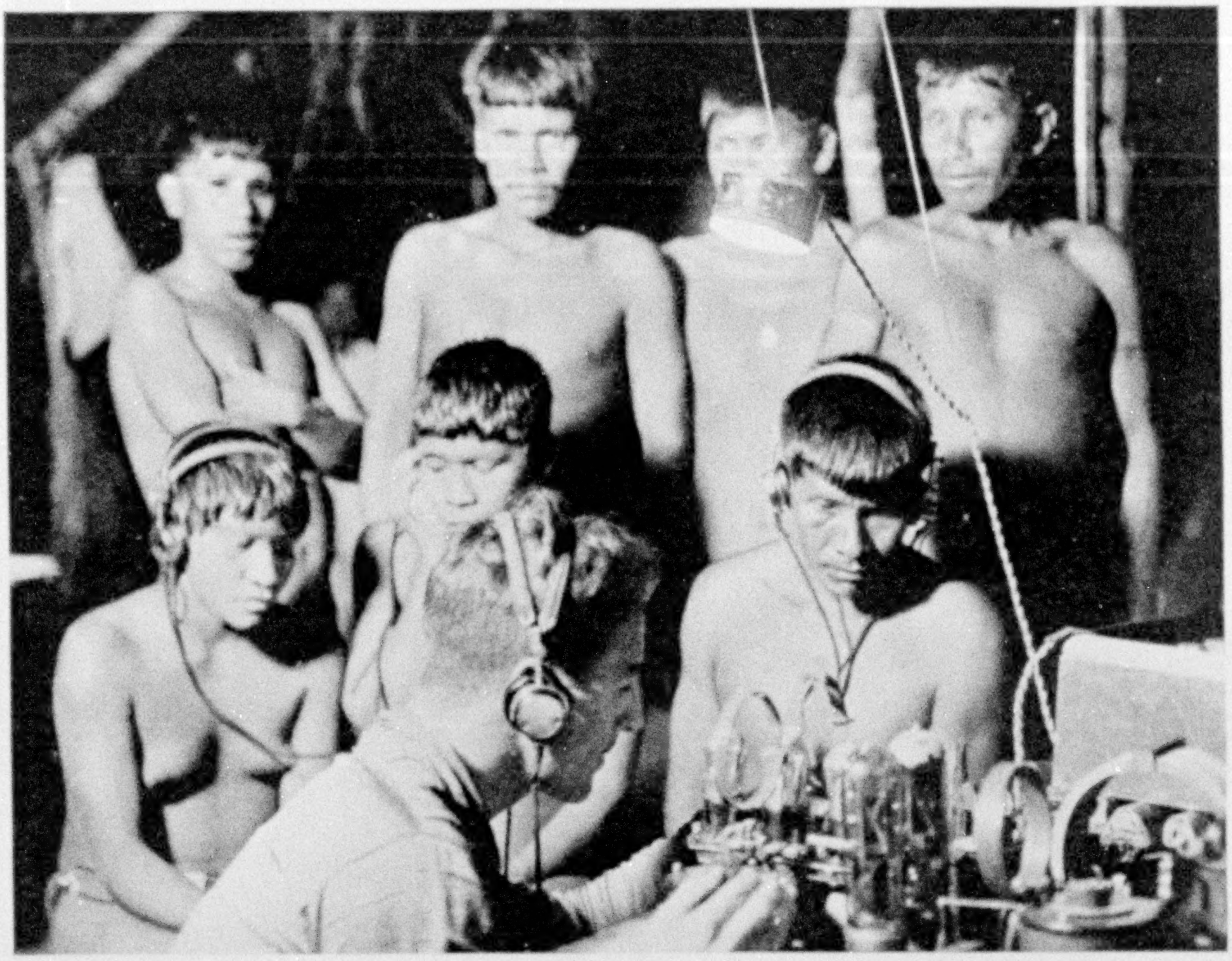
YOUNG MEDICINE MAN OF THE MAYONGONG TRIBE

His rawhide bag contains pebbles, roots, and a miscellaneous collection of rubbish with which he works his healing magic upon the credulous.



PRECARIOUS SLEEPING ACCOMMODATIONS: THE ONLY BED KNOWN TO THE UPRIVER INDIANS

It is remarkable how the natives rest in such contrivances. As a matter of fact, they sleep very lightly, but put in quite long hours, for they go to bed at nightfall, as a rule, and often are to be found in their hammocks in the daytime, if in camp. They may be seen around a campfire in the evening smoking and drying fish; if not so engaged, they are likely to be in hammocks. Mosquito nets are unknown among the Indians; this accounts for some of the wakefulness of native sleepers. If in a malocca, or community hut, the presence of smoke from cookfires tends to lessen the trouble from mosquitoes.



MAKU INDIANS OF THE RIO URARICOERA LISTENING TO A TALK ON EDUCATION BY JUDGE GARY BROADCAST FROM PITTSBURGH

On setting off the flashlight the Indians suddenly departed, head sets and all, but fortunately the plugs pulled loose. From a distance of 25 feet they were coaxed back again. Jazz music meant nothing to them; neither did songs or recitations. They got more "kick" out of an ordinary mouth-organ, or harmonica, than out of the radio. Weight and bulk considered, a mouth-organ possesses greater trade possibilities than almost any other article except a burning-glass or a good knife (see text, page 412).

three men and a boy, were passing down the river in a dugout and, spying the wisp of smoke from our camp fire, stopped to investigate.

We were boiling fish for breakfast when they appeared, and here arose a question of etiquette: How was Civilization to introduce itself to Primitive Man?

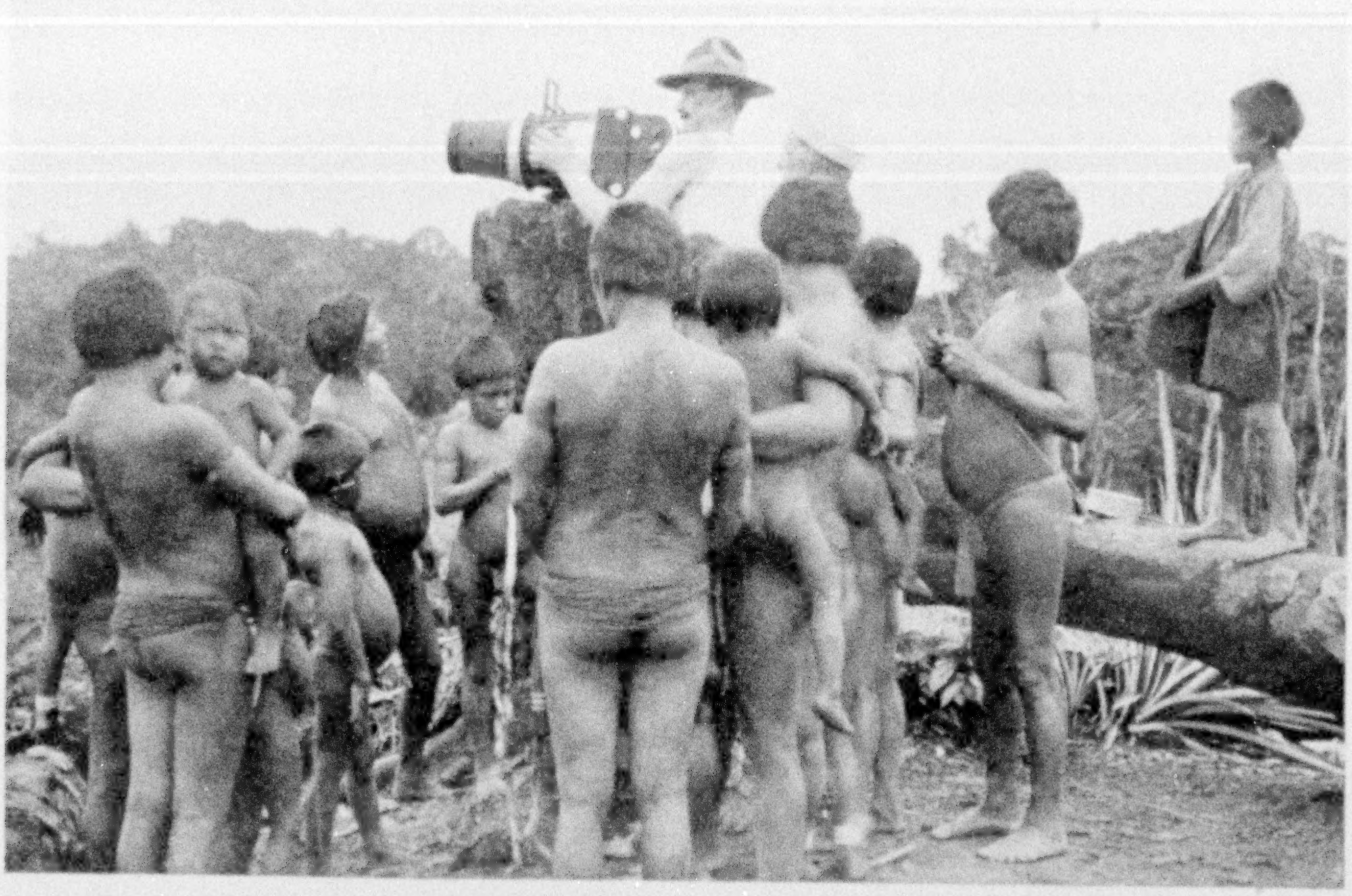
The approach might be extremely important. Dr. Rice had been attacked a few years previously by a hostile tribe of Indians on the Orinoco slope, and 200 miles away to the southwest 68 members of an oil-prospecting party were massacred only two years ago.

Breaking bread was a peace offering long before the olive branch was thought of; so we pointed to the fish in the pot and indicated by signs that they were to help themselves. This they did with evident satisfaction, thus sealing a pact of good will.

Our visitors were superior in appearance to the Indians we had met down river. In facial contour they resembled Mongolian types, and their straight black hair was cut in a "soup-bowl" bob.

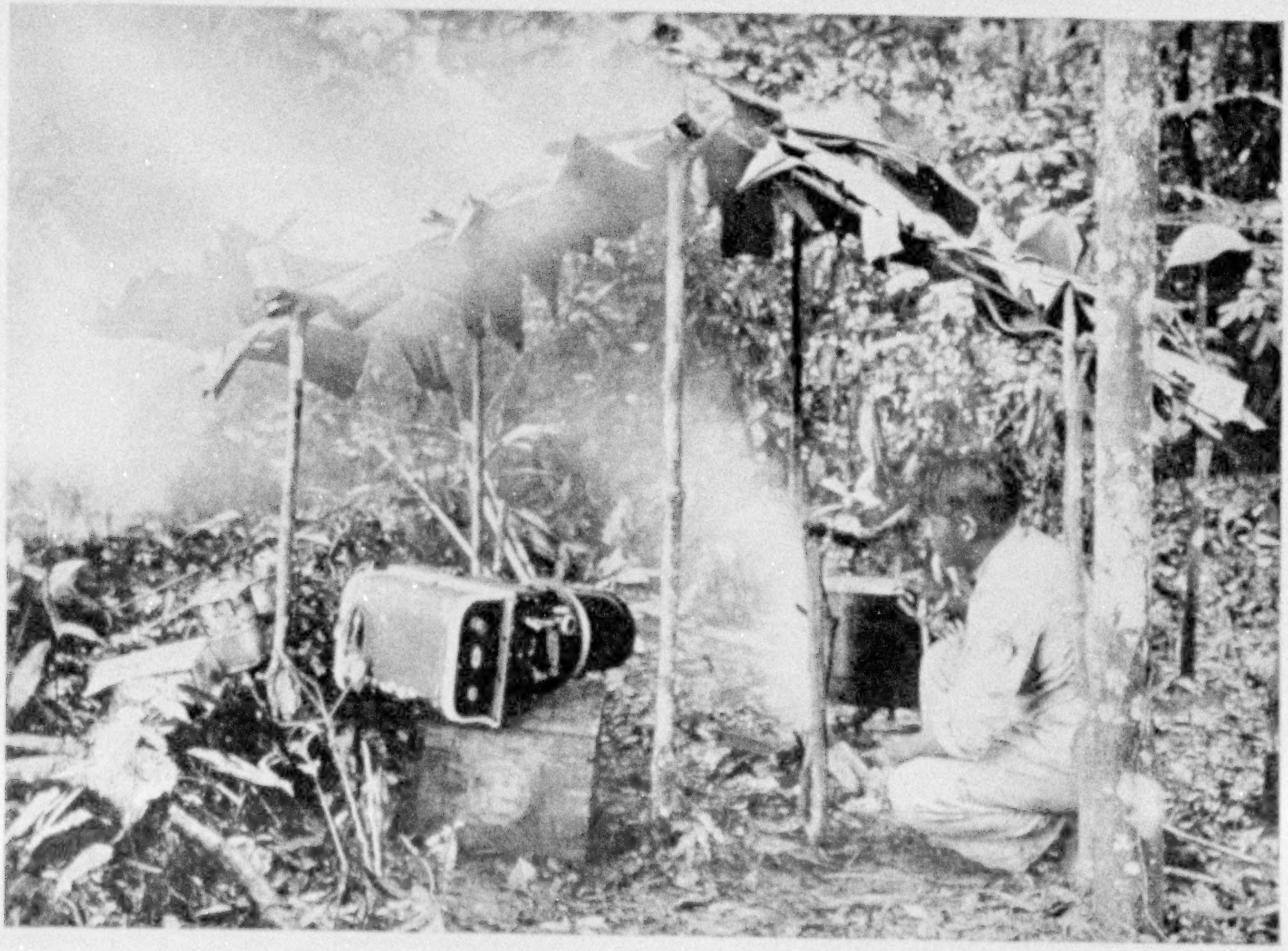
We must have seemed veritable white giants to these natives, for the tops of the men's heads came parallel with our chins.

Each individual was scrupulously clean, and we observed that they bathed regularly. We found them to be keen mentally, sturdy, contented, helpful and kindly to each other, but each man thoroughly independent and self-sufficing. This was the first time, apparently, that they had had any contact with civilization. They had no iron whatever, their



OCCASIONALLY THE HYDROPLANE CAMERA WAS BROUGHT ASHORE TO PHOTOGRAPH DISTANT MOUNTAINS

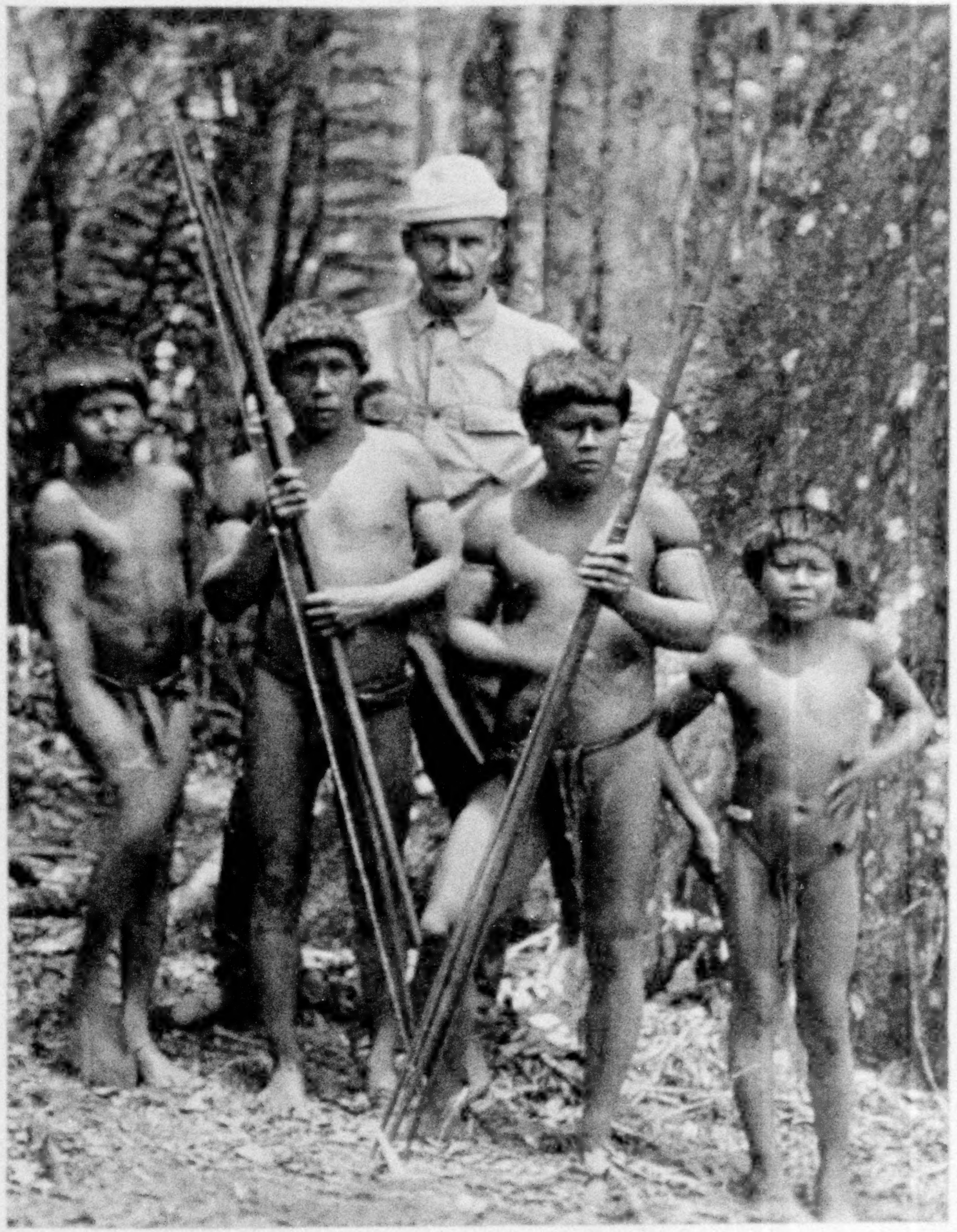
The interested spectators are Mayongong Indians. Sometimes, after the author had taken photographs of natives, he developed and printed small negatives overnight in order to show his subjects their pictures the next morning.



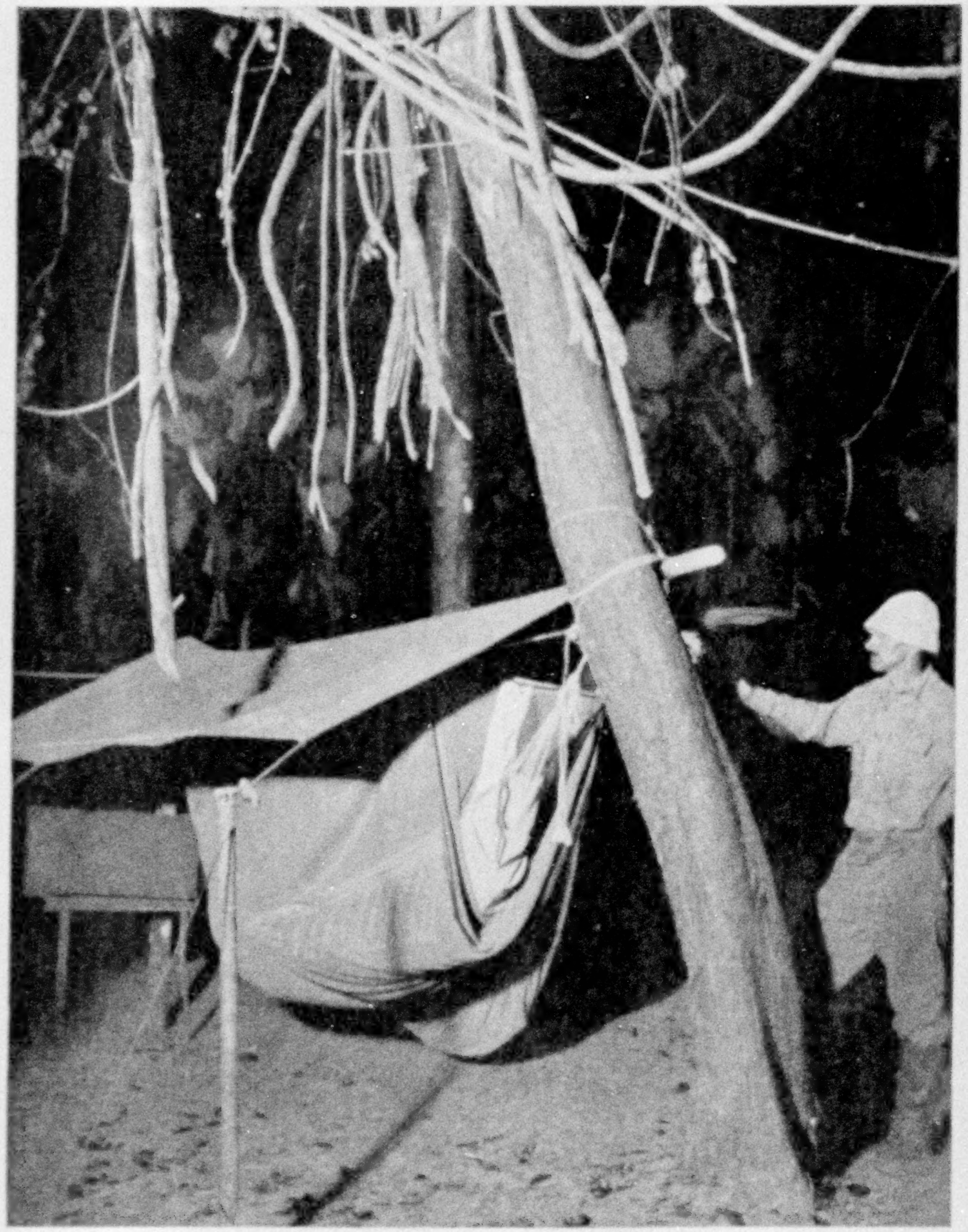
TOASTING THE AËRIAL CAMERA BEFORE THE DAY'S FLIGHT

The atmosphere of the Tropics contains so much moisture that water condenses upon a cool glass surface. It was necessary, therefore, to heat the camera gently before the fire in the early morning, so that when it was installed in the hydroplane the lens would not fog.

ANTS HAD SUPPED ON THIS SHIRT OF HINTON'S (SEE TEXT, PAGE 408)

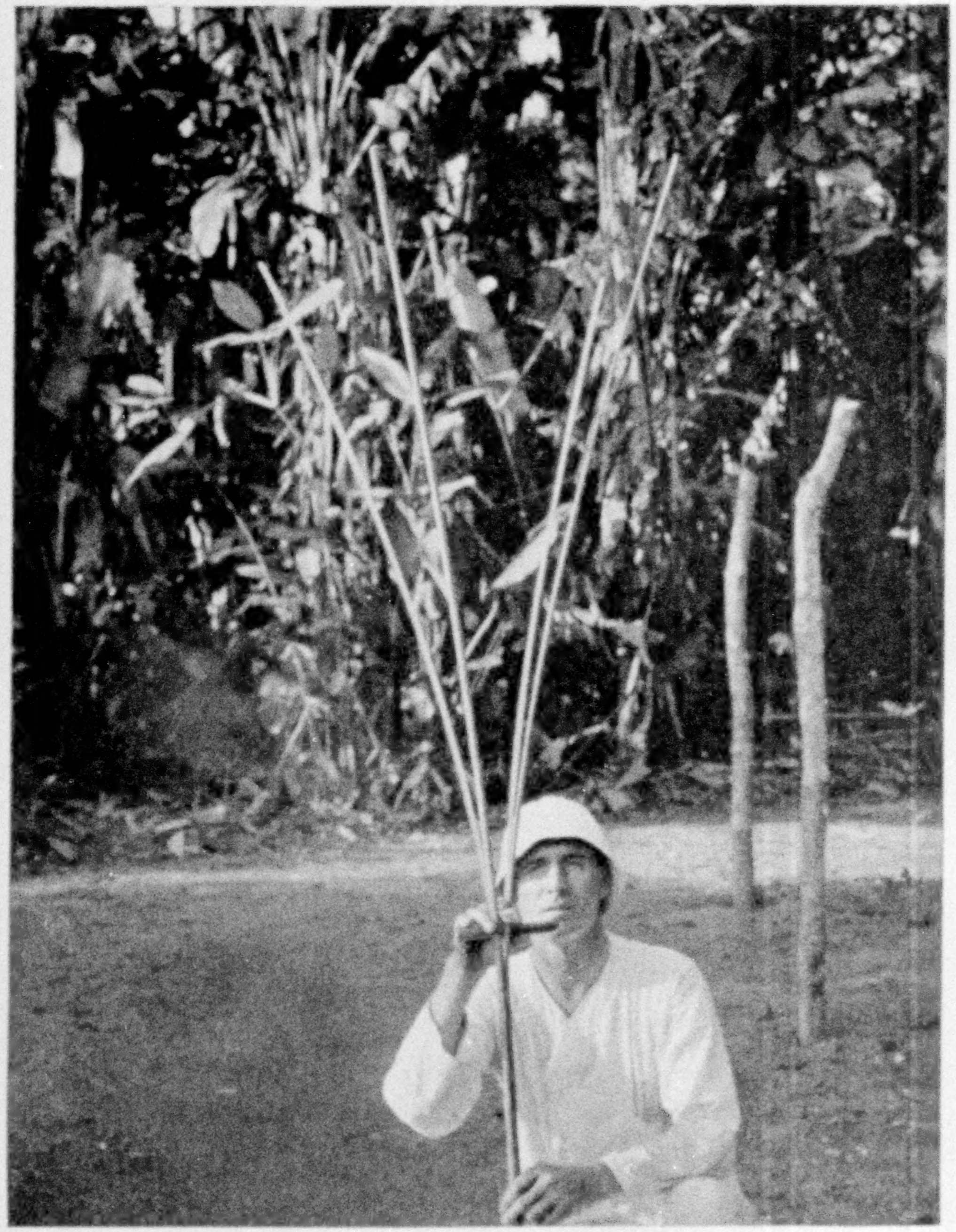


THE TALLEST OF THE MAYONGONG INDIANS CAME HARDLY MORE THAN SHOULDER-HIGH TO MEMBERS OF THE EXPEDITION



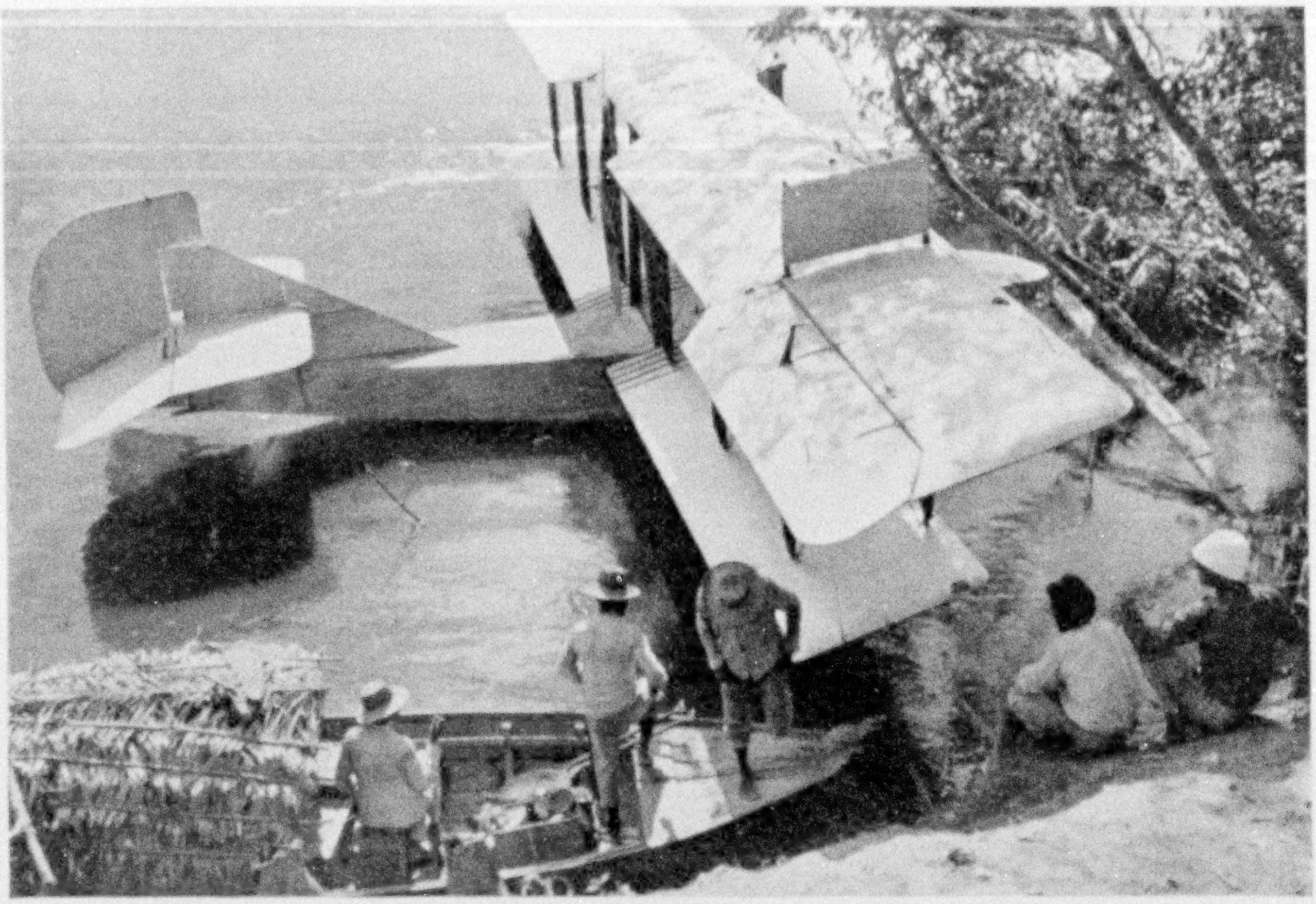
FLASHLIGHT OF A NIGHT'S LODGING IN THE AMAZON VALLEY

The bit of canvas spread over a ridge pole provides shelter from the rain for the occupant of the hammock, shrouded in mosquito netting. Above the shelter are the ends of vines which had to be lopped off to afford swinging space.



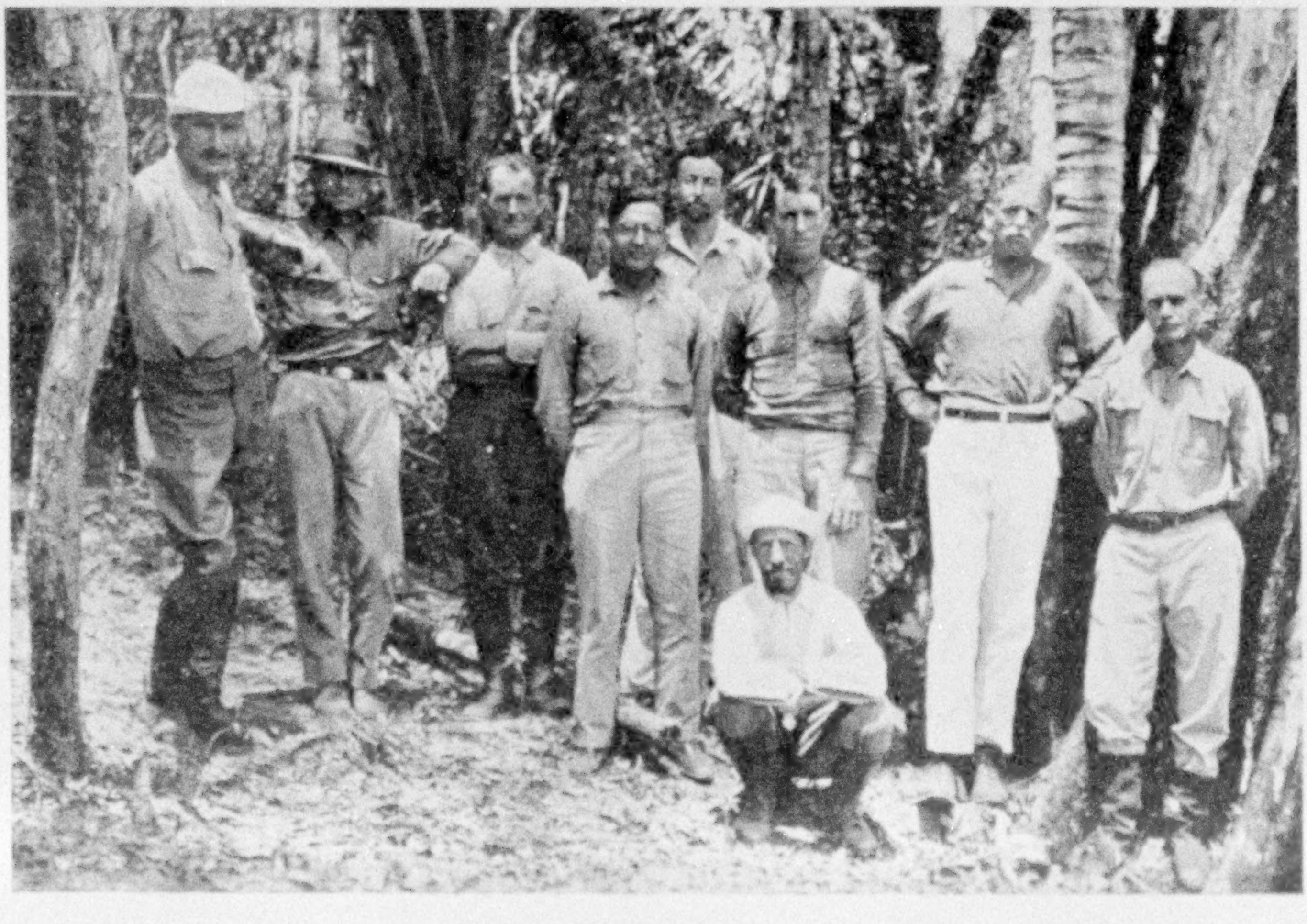
CONVERTING REED INTO BINDING TWINE

Two small blocks of wood divide the reed into four thin, pliable strips, which are used in erecting rough, temporary shelters in the forest. When cut green the strips are flexible and tough and take the place of valuable cord.



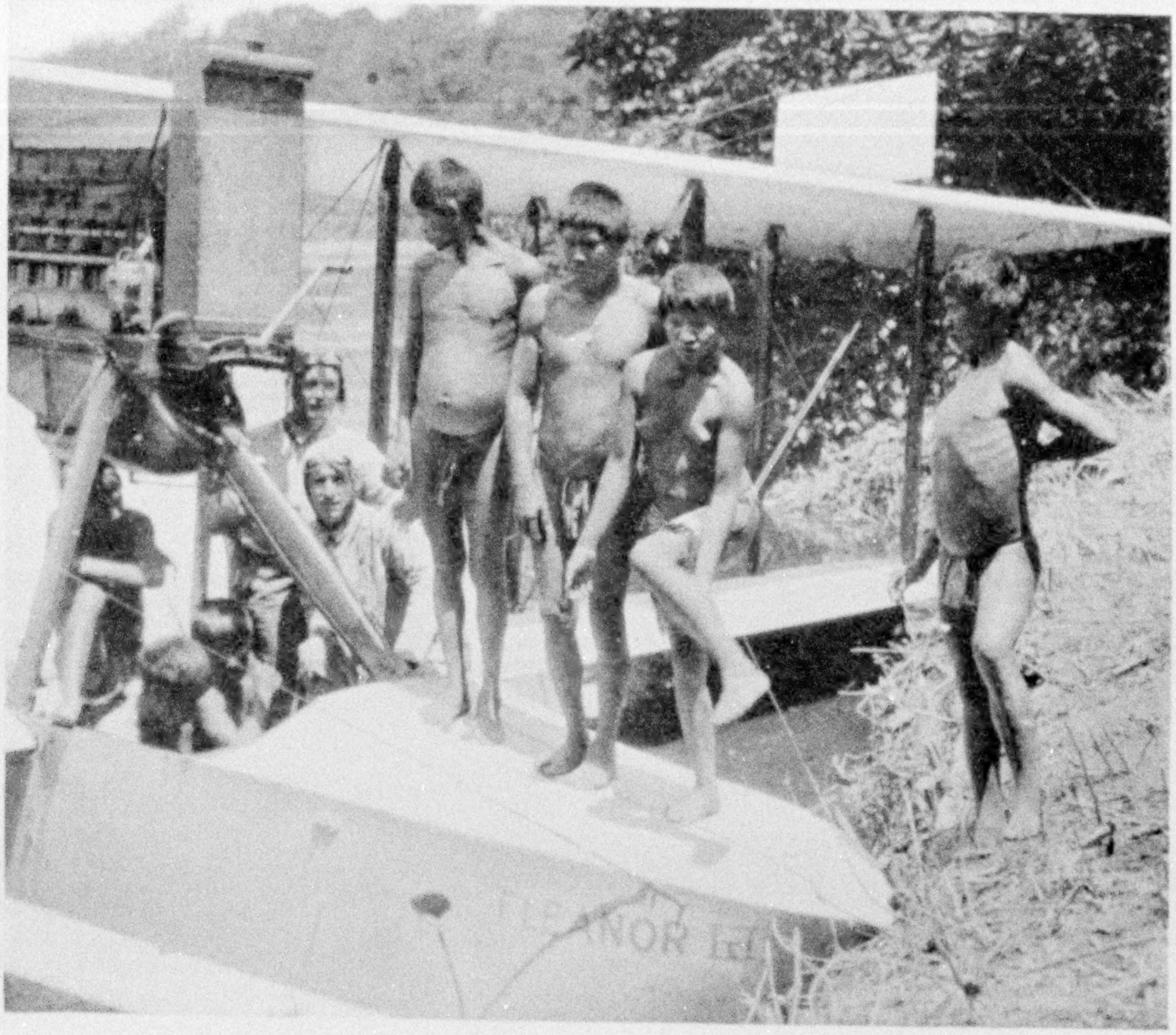
THE "ELEANOR III" TIED TO A BUSH IN THE SWIFT CURRENT OF THE URARICOERA

In the foreground is one of the canoes used by the expedition. The thatched awning amidship protects the cargo from rain and sun.



NINE OF THE WHITE MEMBERS OF THE RICE EXPEDITION, AT KULEIKULEIMA, NEARLY 1,700 MILES FROM THE MOUTH OF THE AMAZON

Left to right: Stevens (observer); MacCaleb (radio telegraphist); Wilshusen (mechanic); Camara (interpreter); Arnold (astronomer); Hinton (pilot); Dr. Hamilton Rice (chief); Dr. Shattuck (physician); and stooping, Santos (motion-picture photographer). Forty Indians were employed in this region.



TALKING TO THE INDIANS THAT VISITED THE FLIERS AT KULEIKULEIMA ROCKS

One of the natives is slapping himself vigorously because of insects (piums).

boat and weapons being forest products, yet they saw at once the value of metal, for they did their best to obtain our machete by trade.

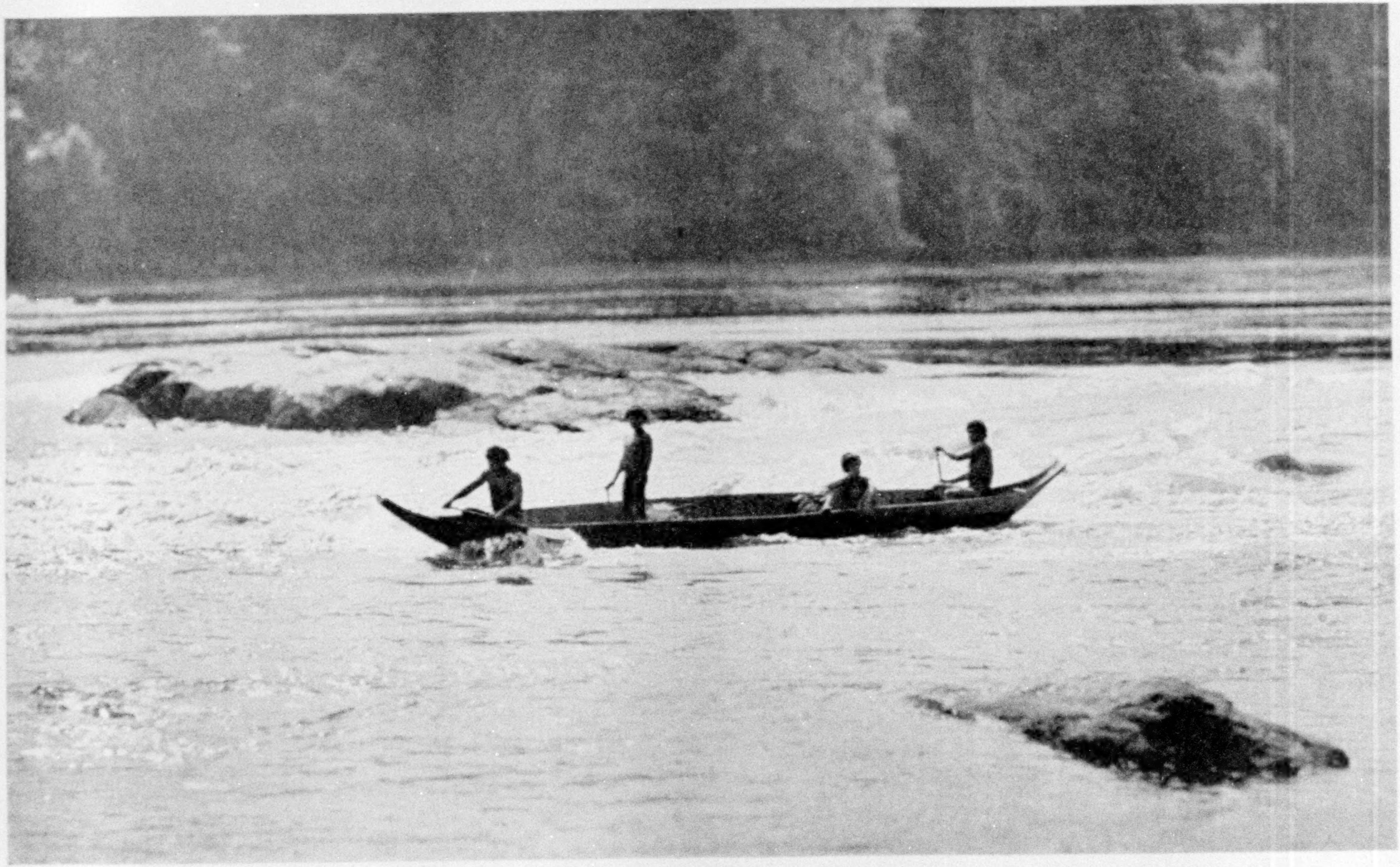
The hydroplane was on the other side of the island, screened from camp, but we had worn a slender trail to it, and, although hardly discernible by us, the Indians saw it soon enough. Evidently their curiosity concerning our method of arrival was aroused, for with one accord they arose and filed down the trail. They were not greatly surprised at the sight of the big plane; they seemed to think that the white giants might have almost anything.

These Indians, Hinton and I noticed, were not bothered in the least by mosquitoes or gnats. Their fine brown skin, smooth and satiny, showed no evidence of insect attacks, although they wore nothing for protection. We developed a theory that their failure to use either salt or sugar so changed their blood and perspiration that they were not attractive to insects.

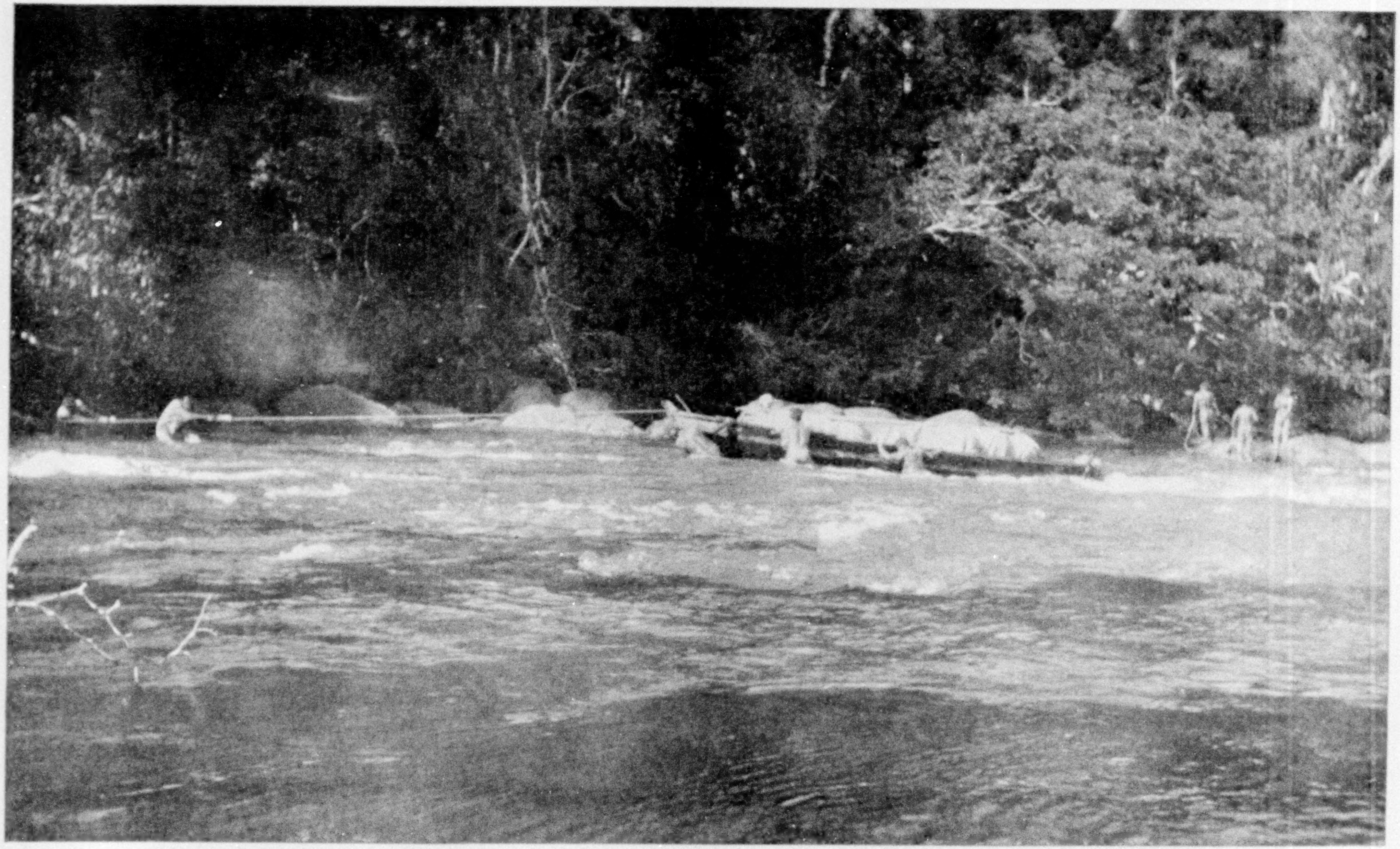
The Indians later on met our main party, but Hinton and I never saw them again. We mentioned to members of the expedition the peculiarity which had so impressed us, and we were informed that our savage friends, when last seen, were slapping mosquitoes with great energy. This seemed to us to bear out our supposition that when they began to eat white men's salt and sugar their insect troubles began.

### FLYING INSECTS WORK IN DOUBLE SHIFTS

If unmolested, crawling insects, with few exceptions, will not sting or bite; flying insects, on the other hand, usually are out for blood and work in double shifts. During the day swarms of piums

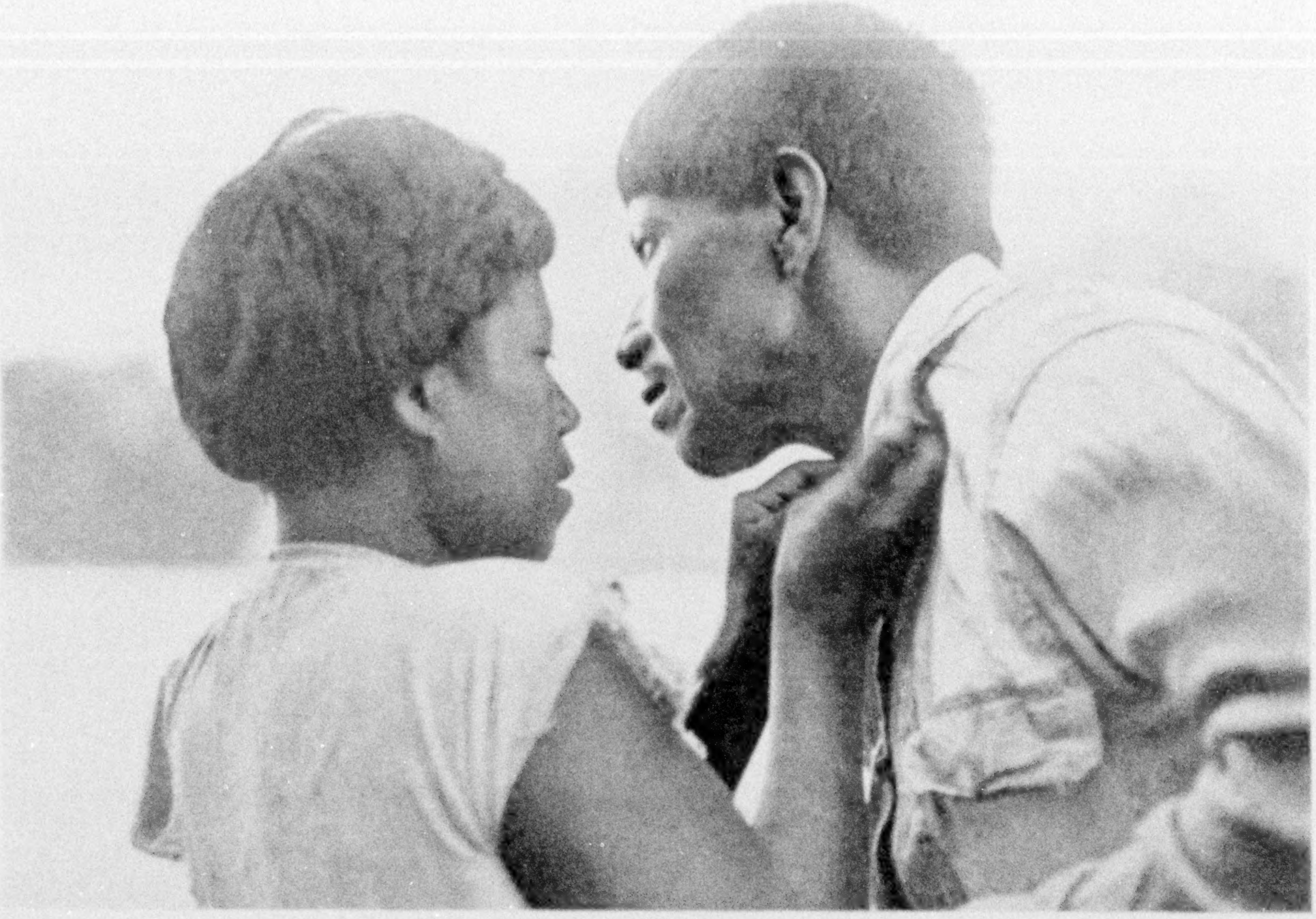


MAKU INDIANS SHOOTING THE SHALLOW FALLS AT KULEIKULEIMA (SEE TEXT, PAGE 388)



PULLING AND PUSHING A LADEN CANOE THROUGH RAPIDS IN THE RIO URARICOERA

The men alongside the canoe sometimes find footing and push, and at other times hang helplessly to the craft until their feet find rocks again. If the stout towline ever breaks, the canoe is sure to turn broadside and upset.



HIS FIRST SHIRT

This Maku chief finds difficulty in fastening the white man's gift around his neck and calls on his squaw for assistance, much as a civilized husband sometimes calls on his wife for help in a similar difficulty.

(gnats) pester mankind; during the night swarms of mosquitoes take up the work where the piums leave off. The piums draw blood and the bite itches. One must not scratch these bites for fear of extending the area of irritation or, what is much worse, for fear of causing the dangerous tropical ulcer.

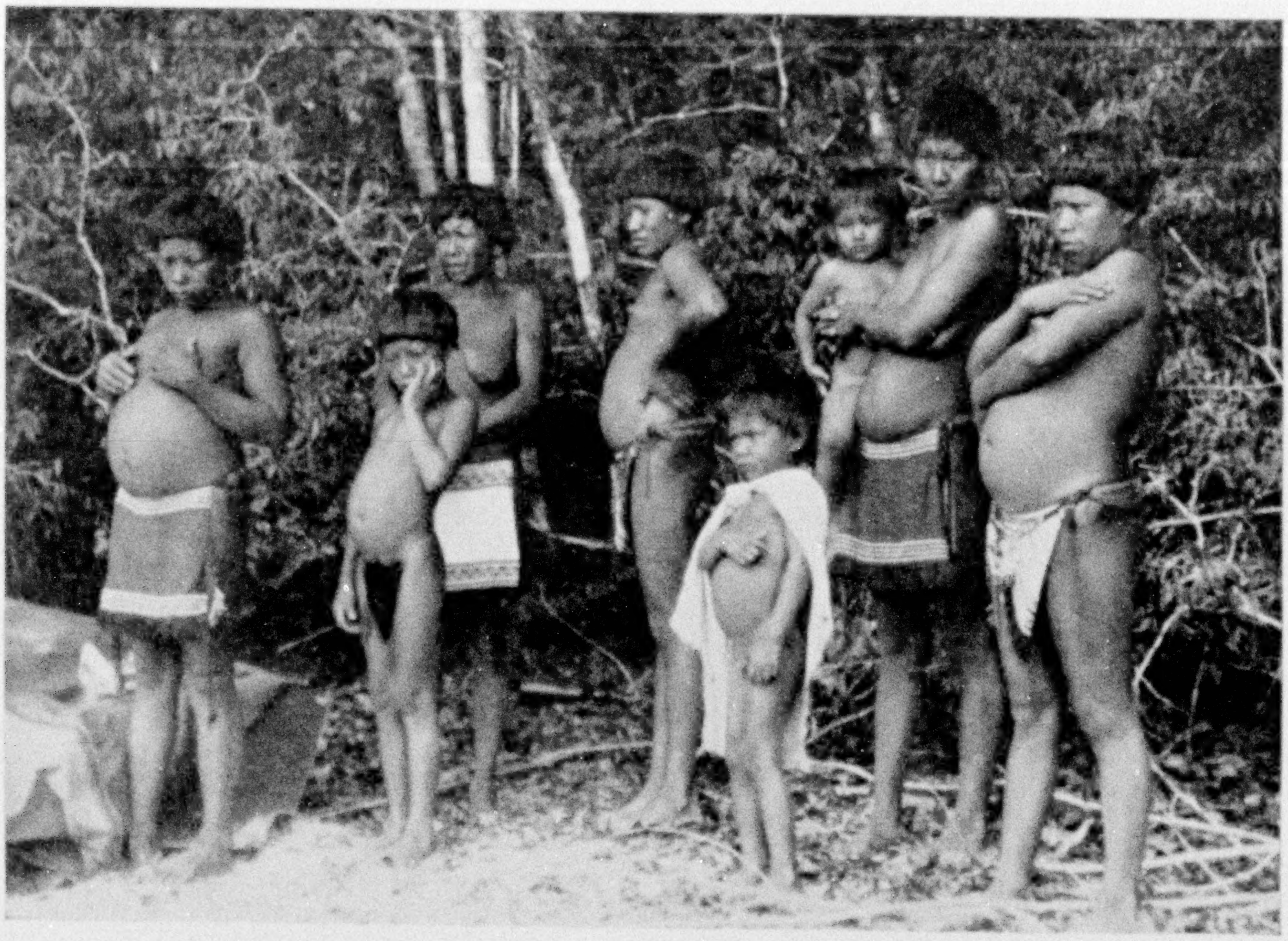
As dark approaches, the mosquitoes come out in great hordes. Unlike North American mosquitoes, they make very little noise while pursuing their vocation, but signal their arrival by puncturing the skin. There are so many of them and so many natives carry the malaria parasite in their blood that, sooner or later, one is almost sure to become infected.

### A SCOURGE OF ANTS

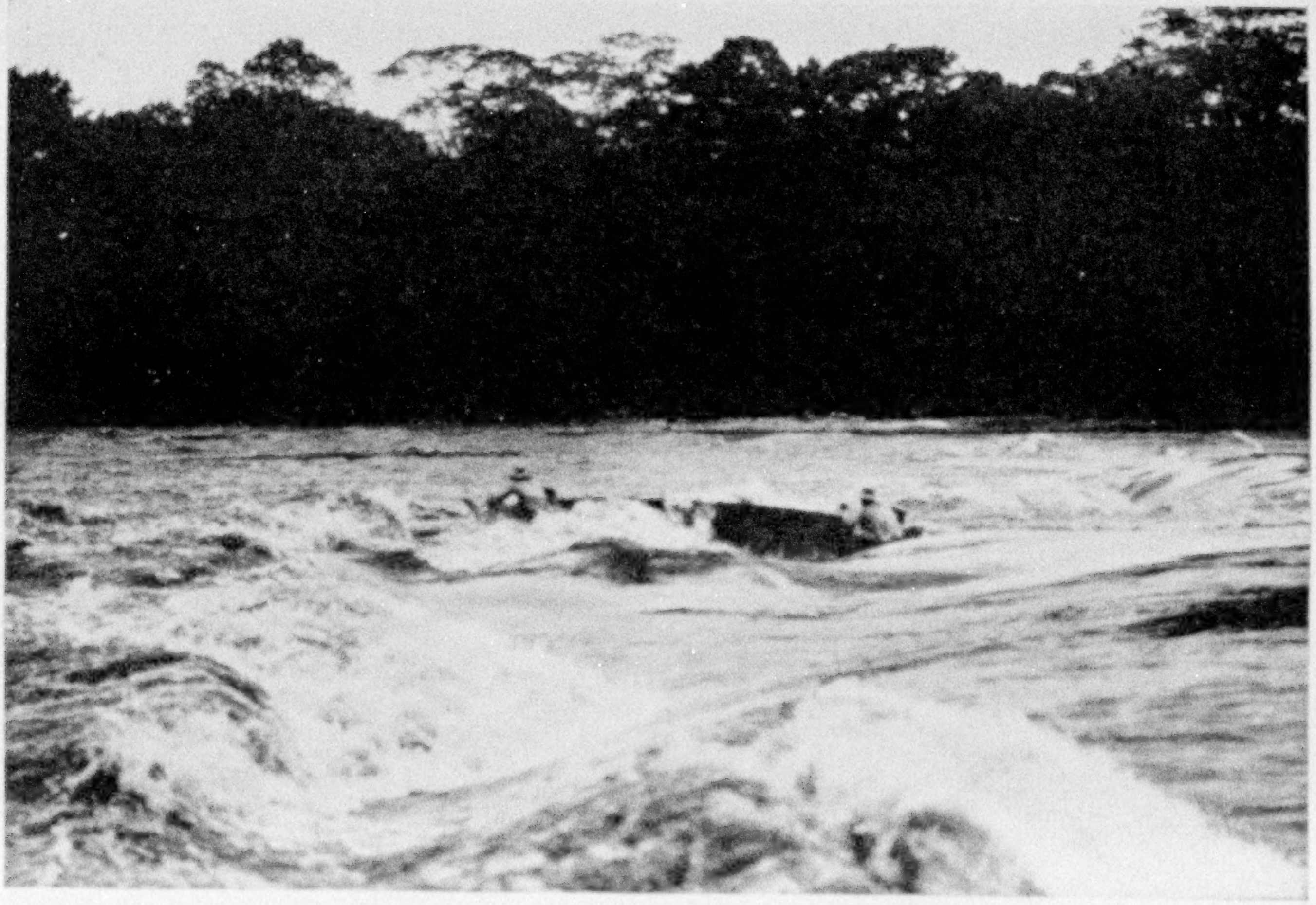
One night Hinton hung his shirt up on a fish line. The next morning when he started to put the garment on it nearly fell to pieces in his hands, being mostly holes (see illustration, page 402). Investigation showed that during the night a labor battalion of ants had gone up and down the line like a file of coolie coal-passers, cutting the shirt to pieces bit by bit.

Nor was this our only experience with ants. There are ants everywhere in the Amazon, and all kinds of ants—black ants, red ants, and white ants, great ants and tiny ants. They get into everything and eat almost anything. They boarded our plane by the hundreds and flew as stowaways, but fortunately the paint of the wings and hull was not to their taste.

Ants appear in one's food always, whether in settlements or in camp. Often one puts a spoonful of native sugar into his cup, skims off the ants from the surface of a little hot water poured in to dissolve the sugar, and then adds coffee. This method seldom removes all the ants,

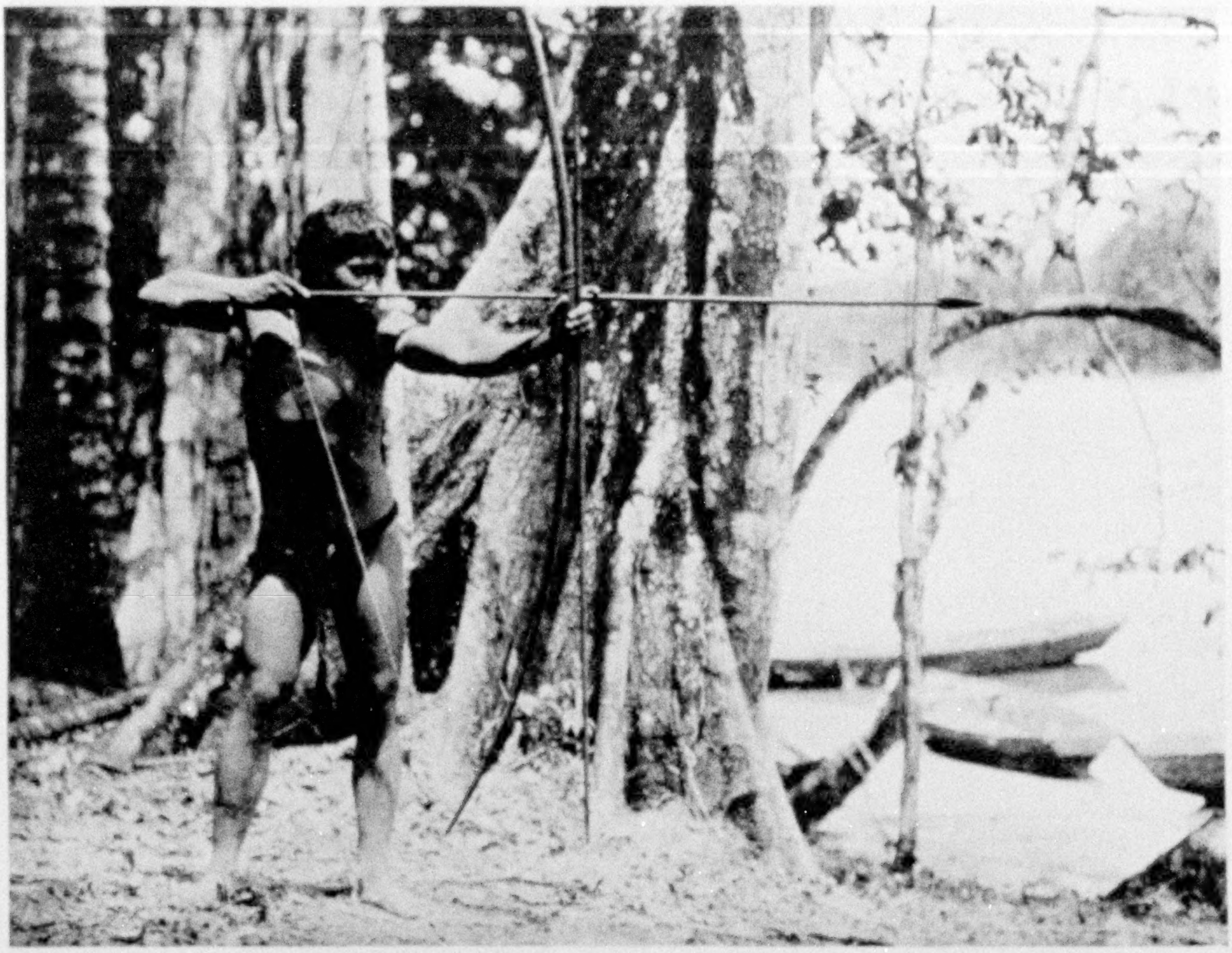


MAYONGONG SQUAWS AND THEIR CHILDREN AT KULEIKULEIMA ROCKS



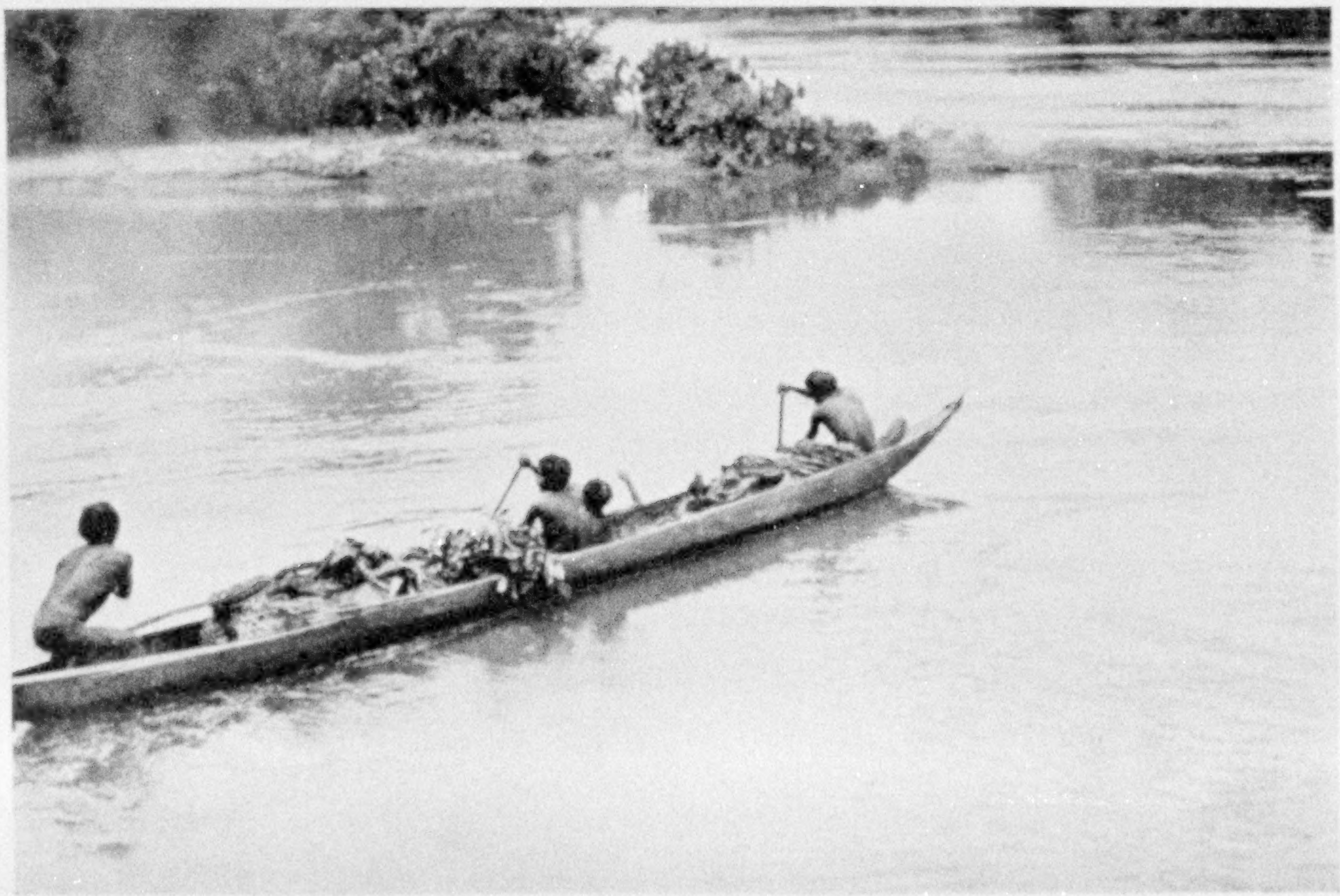
SHOOTING THE KULEIKULEIMA RAPIDS—A FEAT WHICH ALMOST ENDED IN TRAGEDY

The two Indians made this daring trip for the benefit of the expedition's motion-picture photographer. A few seconds after this photograph was made the canoe was caught in a whirlpool and both men were thrown into the seething water. It was only with great difficulty that they were rescued (see text, page 415).



MAYONGONG INDIAN DRAWING HIS BOW

Considerable muscular effort is required, as the bow is very stiff, because of the hard wood from which it is made.



INDIAN MERCHANTS BOUND DOWNSTREAM TO TRADE but after the coffee is added they are not readily seen!

One of the most dreaded insects in the Amazon Valley is the large *tucandeira* ant, whose sting is excessively irritating. Some Indians use it to test the manhood of their boys. When a youth reaches a certain age he must put his arms into a hollow bamboo containing a colony of the insects, and if he endures the grueling test without flinching he is received into the tribe as a man—a quick and certain method of assaying courage.

### THE RIVER RISES AT LAST

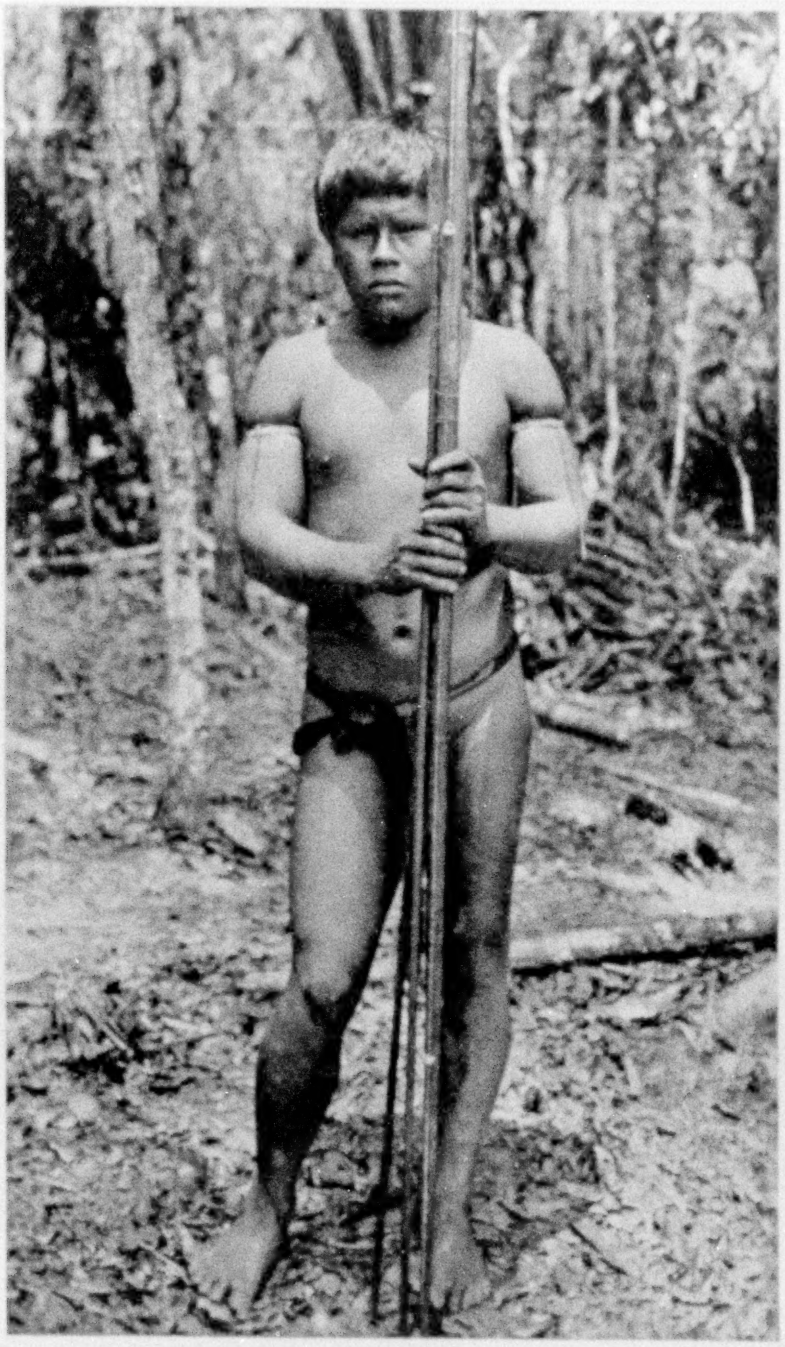
After three days of rain, on the tenth day of our exile on the island, the river rose and, much to our relief, floated the hydroplane again. We had pieced out our meager store of provisions by catching fish, but our salt was gone, and fish without salt is anything but a delicacy. The *Eleanor III* took off beautifully next morning and we shook loose the grip of the jungle. Twenty miles from Boa Esperança we sighted the rescue party, which had been sent to hunt for us, struggling through the rapids.

I left Boa Esperança in a canoe the next day to take a message to the rescue party to push on with supplies to Kuleikuleima. At the first rapids I was astonished to hear the sound of the hydroplane motor above the rush of the waters. There it was over us. I could not figure out why Hinton should be flying, since we had agreed that the plane was to wait until more gasoline had been brought forward.

Hinton swooped and a can was dropped out of the plane. I learned later that this contained a message informing me that he had Couzens on a short sight-seeing trip, but the can went over the rapids and the Indians and I spent a fruitless hour searching for it.

Hinton and Couzens had an exciting "pleasure" trip, due to failure of the pressure tank on the gasoline feed. For such emergencies a hand pump is located near the observer's seat, and Hinton put Couzens to work on it

Ordinarily one probably could not push down on a pump with the left hand 12 strokes per minute for an hour and a half. That would be squaring the daily dozen. But Couzens did it. Indeed, he worked so valiantly that he kept the pressure a pound above the minimum requirement! He told us afterward that when he felt tired he just looked over the edge of the ship, and the sight of the jungle below had a most stimulating effect.



A YOUNG, WELL-BUILT WARRIOR OF THE MAYONGONG TRIBE

Why does he bind his arms so tightly? Why do the Chinese bind the feet of their girls? Just a mark of distinction, perhaps. This binding of the arms was quite as common as the perforation of the ears, both with women and men. In some cases the legs were bound similarly, below the knee.

A LARGE SPECIMEN OF THE VORACIOUS FLESH-EATING PIRANHA

These fish, though not very large (seldom more than a foot long) are the most feared on the rivers of the Amazon Basin. In catching them the members of the expedition used copper wire between the line and hook. Their teeth would sever two strands of the size used for locking turnbuckles on an airplane. Three strands of wire, however, would hold them. These fish when pulled out of water make a loud grunting noise and close their jaws so powerfully on the flat sides of a knife blade as to crush their own teeth (see text, page 377).

The gasoline pump gave us our greatest trouble. One replacement did not cure the difficulty, and on two occasions I had to do some pumping myself.

### RAIN PELTS LIKE HAIL

Flying in the rain was most disagreeable, especially since early in the game we removed our windshield to save weight and air resistance. With the plane flying at 70 miles an hour, even the gentlest of raindrops struck like hail, and our faces were often purple from the pelting. A storm always compelled us to fly low and through clouds. We never knew for certain whether we would find the river or just the endless sea of jungle on the other side of the shrouds of mist into which Hinton dived the *Eleanor III.*

While radio proved its value again and again during our journey, both its magic and that of the hydroplane seemed to be lost on most of the Indians of the upper river basin.* Dr. Koch-Grünberg, who had been through this region with a previous expedition, had with him a portable phonograph and wax disks. He persuaded the natives to talk into the machine, and then had it repeat their words. After that exhibition, nothing could surprise them!

Whenever we took off in the plane, however, the Indians would retreat to the forest and a few faces would peer bravely between the folds of the river bank's green curtains. The noise of the motor seemed to affect them more than the sight of the plane, which they called *O Bicho Grande* (The Great Insect).

The radio interested the natives not at all. A number of times we put receivers over their ears when we were getting jazz music or speeches from Pittsburgh, but neither seemed to arouse any enthusiasm on their part (see illustration, page 400).

### FLASHLIGHT POWDERS IMPRESS INDIANS

The flashlight picture made the greatest hit of all. At one camp on the Branco we made a flashlight photograph of one group of Indians while another group looked on. The party "shot" was startled into momentary flight, while the other Indians, who were looking on, laughed uproariously. At another place, however, we came near getting into difficulty by shooting a flash in a *malocca* (communal hut). The natives saw the smoke billowing out of the top of the hut and concluded that we had set fire to it. They gathered around us, gesticulating and jabbering, until we set off some more powder outside to show them that no harm had been done.

It was not difficult to get the natives to pose. Our problem was rather to get them to "unpose." Once they struck an attitude which the photographer desired, they held it indefinitely. No Hollywood director ever had more patient subjects. While we were preparing to photograph or were busy with some other duty, they had the habit of standing on one leg like storks, the unused limb being crooked to permit placing the sole of the foot against the supporting leg at the knee.

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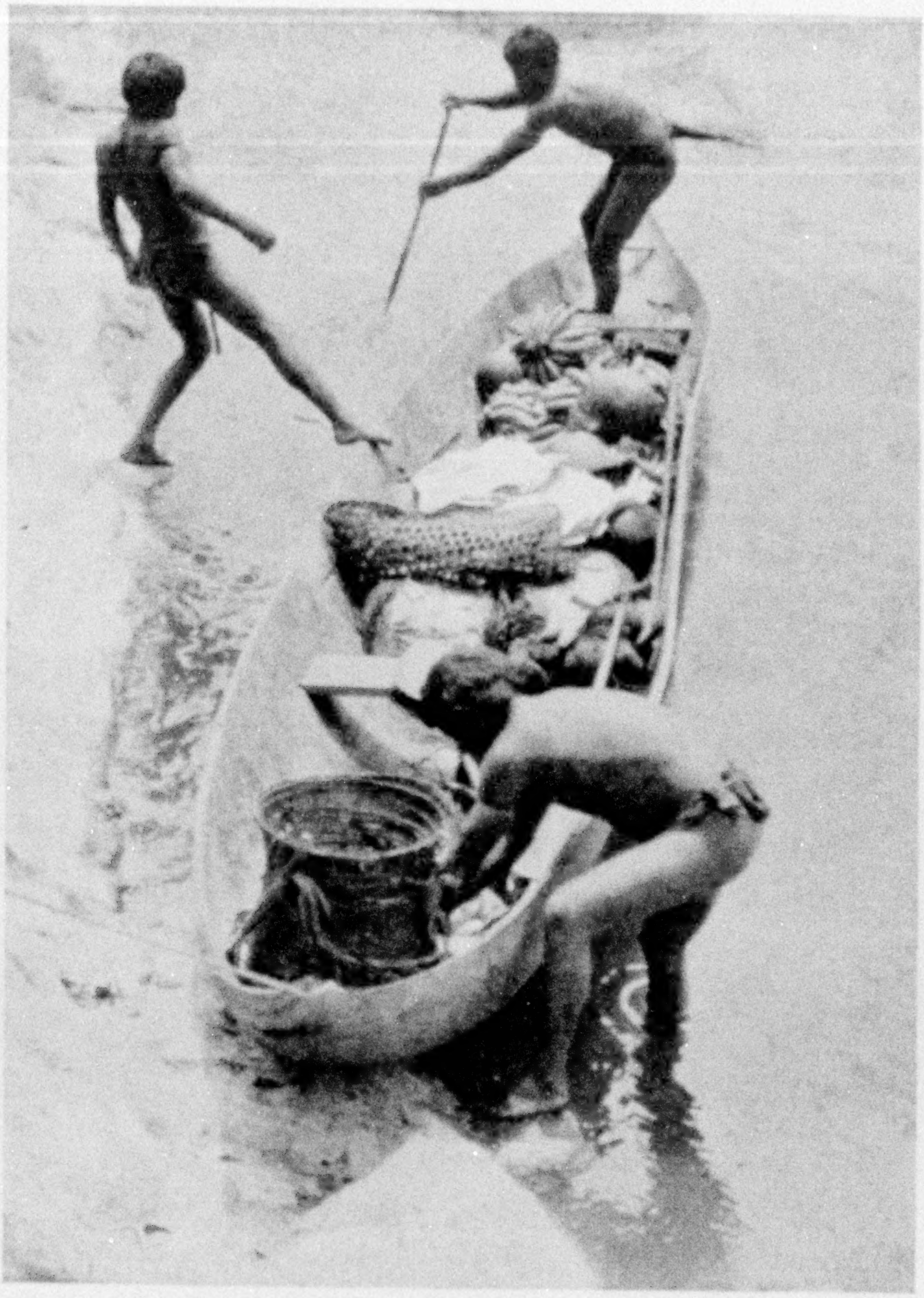
* Commander Donald B. MacMillan records a similar attitude on the part of Greenland Eskimos (see page 402 in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1925).

Many photographic problems were faced in the Tropics, not the least of which was the provision, or rather the lack of provision, for dark rooms. At one place the hollow trunk of a big tree served this purpose. The first precaution was to keep the film dry, and as everything mildews in the tropical jungle at the slightest provocation, films were packed in air-tight cans and kept out of the direct sunlight.

Temperature presented another vexing problem, for when developing fluids get above 75 degrees the picture is apt to slide off the film.

I usually developed films at the coolest hour of the 24, and very often this was 3 o'clock in the morning. By charging the so-called "fixer," or hypo, heavily with alum, the soft emulsion was hardened immediately; but we soon found that it was worse than useless to hang the films up before daybreak. In the first place, they would not dry in the moist atmosphere, and, secondly, the wet emulsion proved most palatable to certain nocturnal insects. By morning negatives would look as if some one had thrown rocks through them.



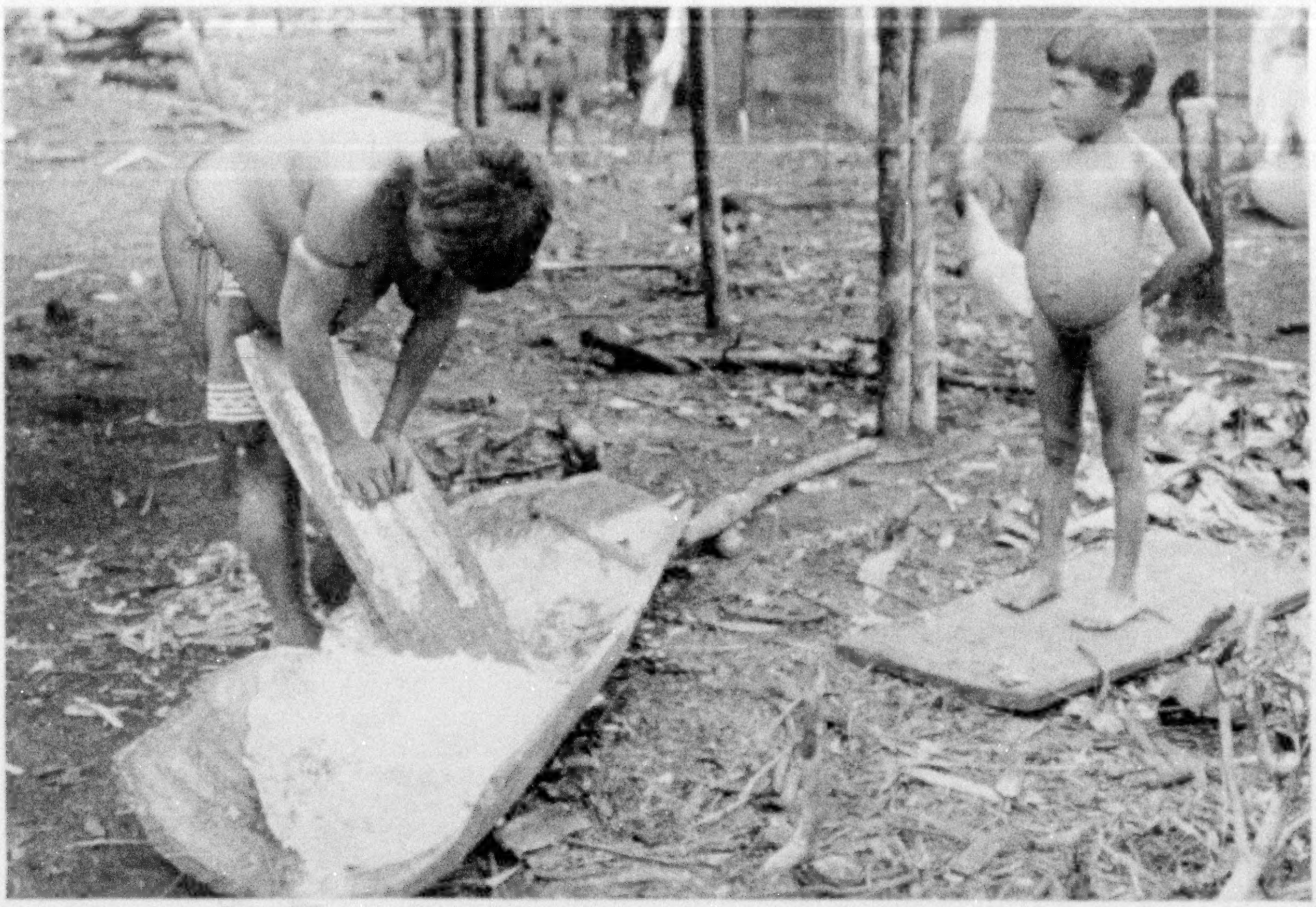
FRUIT TO BE EXCHANGED FOR KNIVES, CLOTH, AND BEADS

The members of the Rice Expedition were glad to trade for supplies of farinha, bananas, etc., as to live on the country lessens the burden of transporting food through the jungles.

### A NEAR-TRAGEDY IS STAGED FOR THE MOTION-PICTURE CAMERA

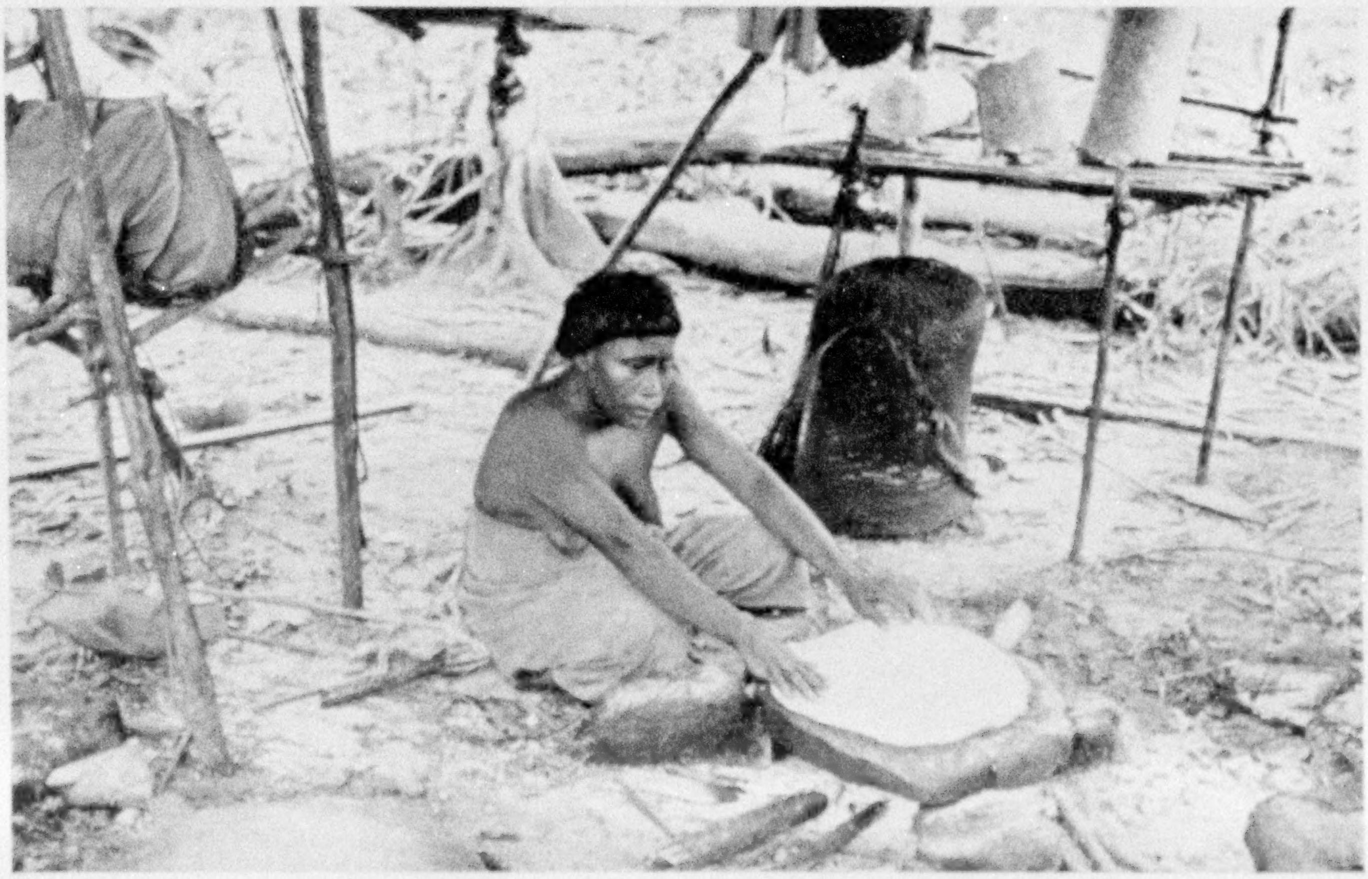
Hinton and I were at Boa Vista preparing to fly to Kuleikuleima Rocks, when a wireless message came from the advance party that the river had dropped and that our landing place had become a stretch of ugly rocks. A few days later a message came through that the water had risen again and the landing place was once more smooth and deep; so we took off and reached the Rocks safely (p. 368).

Silvino Santos, the Brazilian motion-picture photographer with our party, set up his camera on the Kuleikuleima bowlders to photograph two Indians shooting the rapids. The water was very swift here, ending in a whirlpool, and as the Indians came down, Silvino waved them toward the rocks. They became confused and got into the worst water. Up shot the end of the dugout and out went the paddlers. They swept down into the whirlpool, struggling for their lives (see page 409).



GRATING MANDIOCA ROOT IN THE PREPARATION OF FARINHA

The hewn board is covered with pitch and studded with small pieces of flint or with hundreds of teeth of the piranha, making a grater. With a root in each hand, the squaw scrubs vigorously, much like a woman washing clothes, and in a surprisingly few seconds the mandioca becomes pulp. Farinha is the staple food of the Amazon Basin, for the wild Indians as well as for the Brazilians.



DRYING FARINHA ON A HOT SLAB OF ROCK

Farinha comes in the form of small, hard kernels, sometimes white, but usually yellowish in color; but for transportation it is better to make the mandioca pulp into cakes, which when dry are about half an inch thick and a foot or more in diameter. These cakes are stacked in lots weighing some seventy pounds, covered with green leaves, and bound with vines. It requires strong teeth to bite a piece from one of these cakes and to chew it afterward.

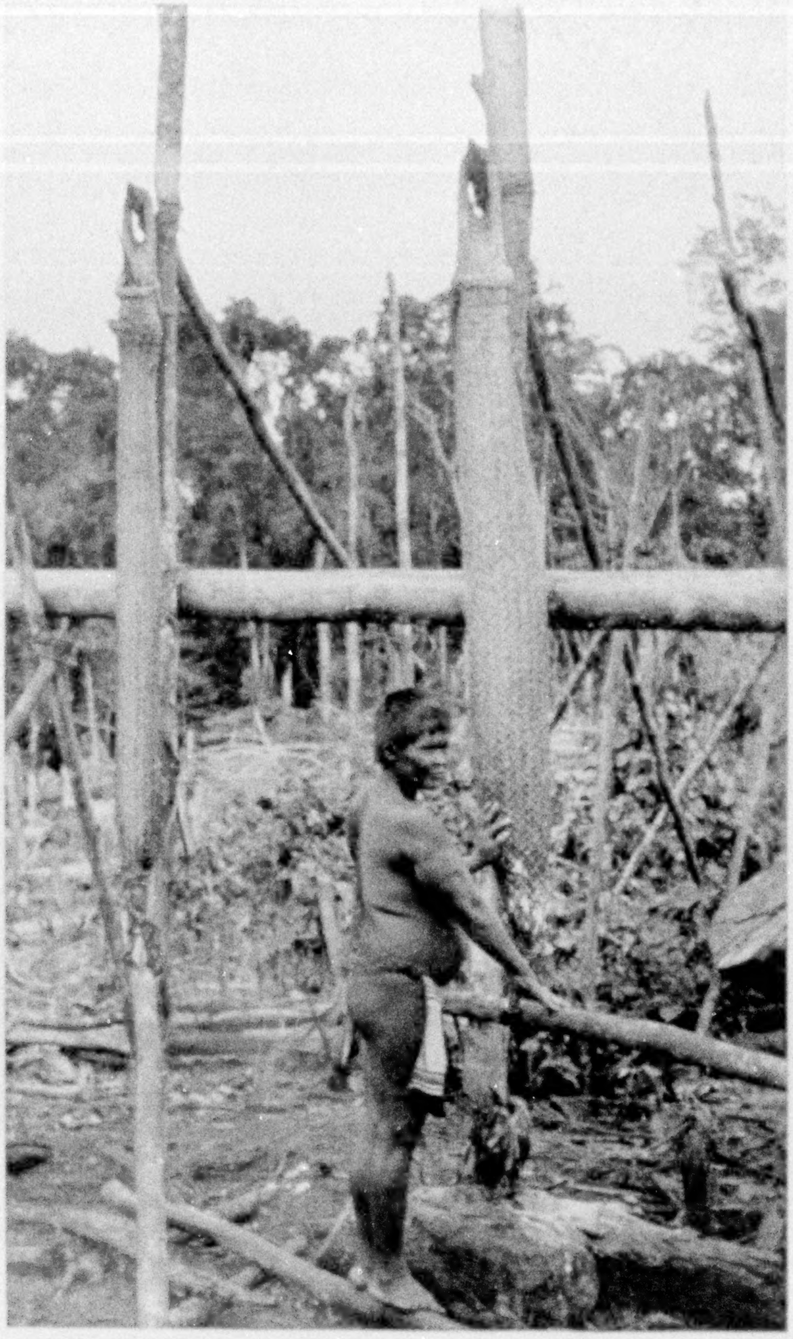
A reserve canoe manned by Portuguese-speaking Indians shot out from behind the rocks to the rescue.

"Wait, wait!" shouted Silvino; "I've got to put in another roll of film!"

Fortunately, the Indians ignored the demands of thrilling photography and struck out furiously toward the bobbing figures. The chief actors of the drama, though very powerful swimmers, were nearly exhausted when they were pulled out.

From Kuleikuleima Rocks we flew ahead of the exploring party, sketching the river and photographing those sections which were cut up too much for rapid sketching. By later checks with the ground party we found that the sketches made from the air by the aid of ruled paper and compass were fairly accurate. When corrections of declination of the compass had been made, their percentage of inaccuracy was satisfyingly low.

Our last base was at the junction of the Parima and the Aracasa, where the tributaries join to make the Uraricoera. To this point Charles Bull and his Indians, with great labor, had brought gasoline from Kuleikuleima. Dr. Koch-Grünberg ten years before had pushed on up the Aracasa branch, the lesser of the two tributaries.



FREEING MANDIOCA OF ITS POISON

The large woven tubes filled with pulp are squeezed by the steady pull of a weighted pole or lever. The pulp is then washed with water and squeezed again, until it is free from its harmful ingredient. This squaw, in common with all other women of the camp at the junction of the Aracasa with the Uraricoera, was naked during the first days after the arrival of members of the expedition. Seeing that the strangers wore clothes, the natives gradually brought out the only wearing apparel they possessed. Note the development of this woman's upper arm.

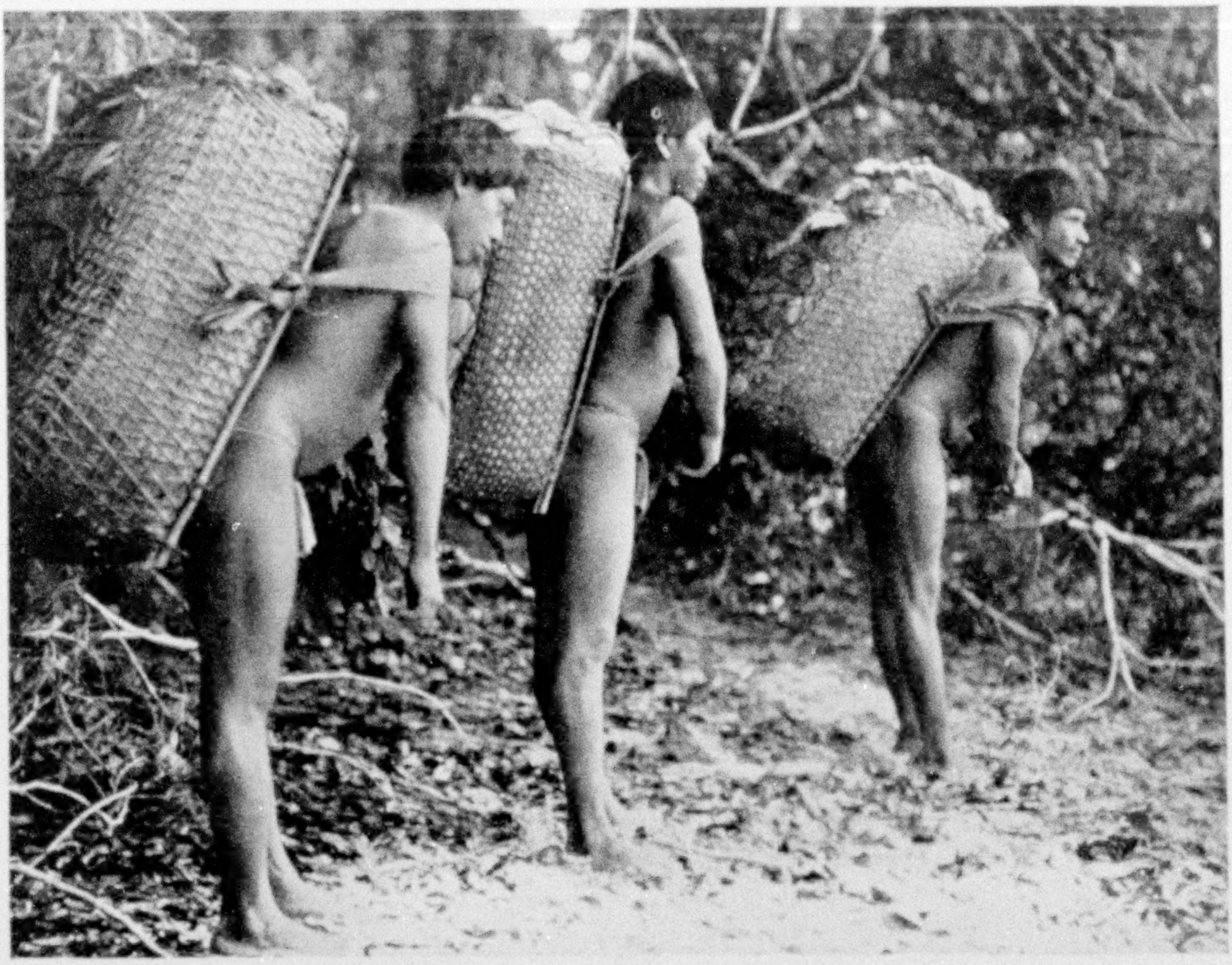
### WE FLY TO THE HEADWATERS OF THE PARIMA

Near the junction a deep canyon cradles bad rapids of the Parima, which have ever been a barrier to white explorers (see page 375).

We were now getting into the mountains. The altitude of our farthest base was more than 1,000 feet above sea level (2,000 miles from the mouth of the Amazon)

On March 11, 1925, we made a four-hour flight to which we had been looking forward since our arrival in Manáos on July 6 the previous year. It fulfilled all our anticipations, for from the moment we entered the Parima Canyon we were real pioneers (see pages 370 to 375).

The rushing waters swept under us viciously, the hills closed in, and the palm trees began to disappear, for the altitude changed the climate; but the jungle still stretched on all sides, muffling the hills and sometimes even the narrowing rapids in green. We discerned many falls in the river and put them on our sketches for the guidance of Dr. Rice's party.



PACK-A-BACKING THROUGH THE FOREST

When the members of the Rice Expedition found it necessary to make portages around swift water, much of the cargo of the canoes was transported in this manner.

The river drops 400 feet in 4 miles in one place. High waterfalls were discovered on the short tributaries coming off the mountain slopes. In the midst of the green we would see a thread of silver water, spun from a source lost in the forest, falling over a sheer cliff into an inkwell of blackness hundreds of feet below (see page 369).

On and on we went, to the headwaters of the Parima and beyond. We rose to the watershed of the range, where the serrated mountains divide the waters, sending some to the sea by way of the Orinoco and the rest down the Amazon. Here and there along the river banks, and occasionally deep in the forest, we saw the round maloccas of Indians. This was the first time we had ever seen Indian huts away from the watercourses; but this was warring country and it was probably necessary for the inhabitants to take extra precautions (see pp. 370-1-2).

Some of these maloccas appeared to be occupied and others deserted. Perhaps the owners had been frightened away or killed, or perhaps natural death had visited some member of the communal family. Amazon Indians of this region have a superstition that when an important member of the tribe dies, the others must leave the malocca where the native expired. The tribe never uses the hut again. They clear a new place in the forest, erect a circlet of poles, weave basketry walls, and raise another thatched roof on center poles.

Over the Indian camp sites on the upper stretches of the river we released parachutes, to which were attached beads and trinkets of various kinds. These gifts were peace offerings to show the friendliness of Dr. Rice's party, which was to advance into this country later. None of the ground party was ever molested; so the parachutes may have served a useful purpose.

By this time our gasoline was nearly

half used up, so we turned downstream through our newly discovered country.

The situation had its ironic side. Here we were, the first white men who had ever penetrated into this corner of the Amazon Valley, discoverers on an old sphere that has been pretty well discovered, charted, and nailed down. Yet we couldn't set foot on our land nor swim in our river. Our eyes were privileged to see magnificent falls, but the swift product of our speedy age whisked us away from the cataracts after a moment's contemplation. From an elevation of 6,000 feet we greeted the inhabitants of this new country with parachutes!

The report we brought back and the maps and photographs of the river were invaluable to the ground party, but obviously the story of De Soto, La Salle, or any of the early explorers would provide not nearly such rich reading to-day if they had used airplanes.

At the head of the canyon was a good malocca, so we swooped to photograph it. This brought us into the superheated air of the valley, and when Hinton tried to rise he found that the radiator water boiled furiously. We were below the canyon rims, 600 feet above the bed of the gorge, whereas we preferred to be 3,000; but there was no way to get there.

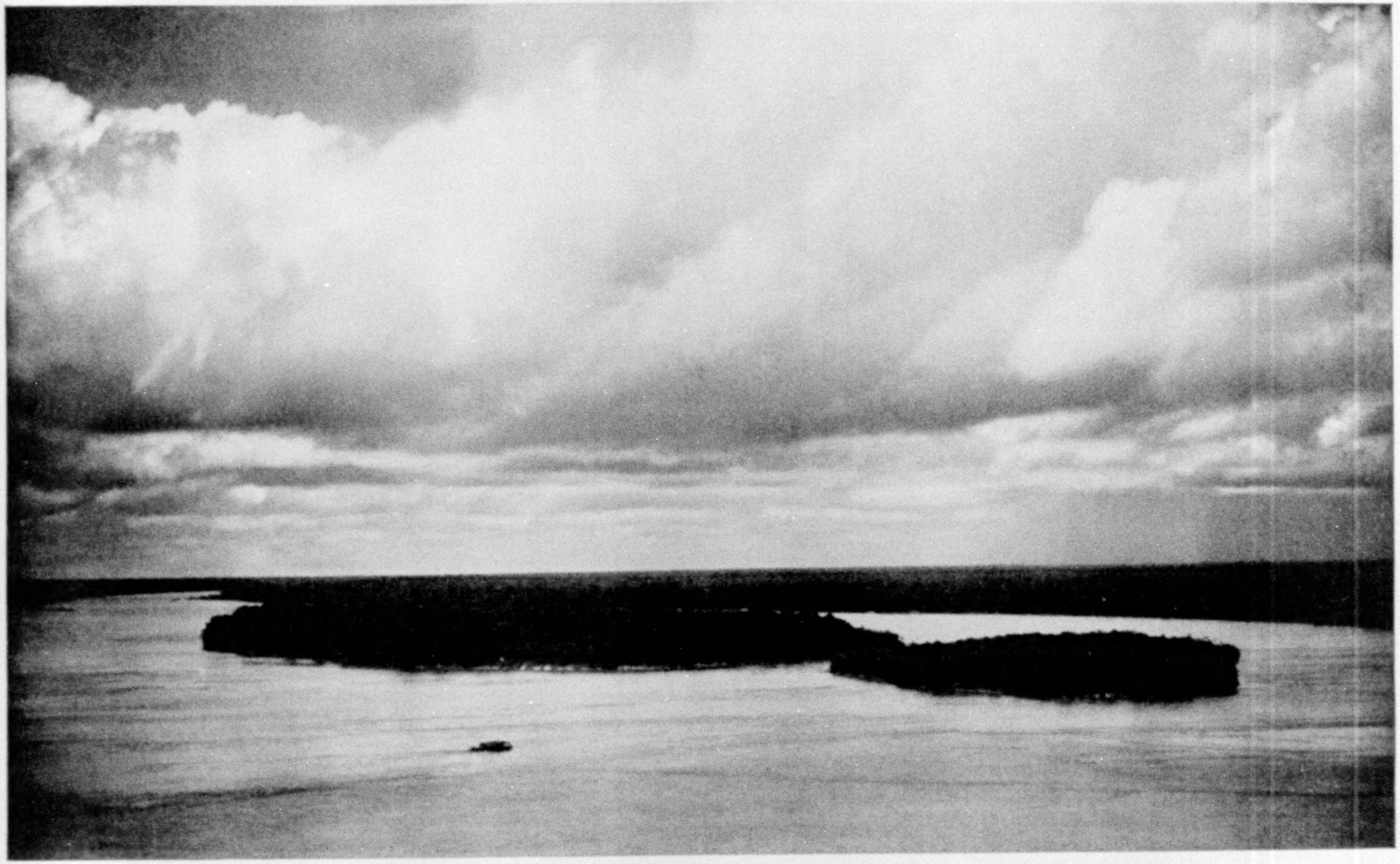
The only possibility of coming out was to follow the canyon, taking all the swings of the narrow river, and this we did. With the walls of the gorge rising above us, Hinton banked and wheeled and hung to the little altitude we had. "S" turns and angles loomed before us, but finally the end of the canyon came and before us unfolded the welcome sight of a wide, smooth stretch of water.

The *Eleanor III* glided down to the base, where Charles Bull and his Indians were waiting for us. We thrilled with satisfaction, for we had finally accomplished that which we had worked nine months and traveled thousands of miles to do.

I was to meet Charles Bull in California six months later and learn from him how useful our air sketches of this unknown country were. On these

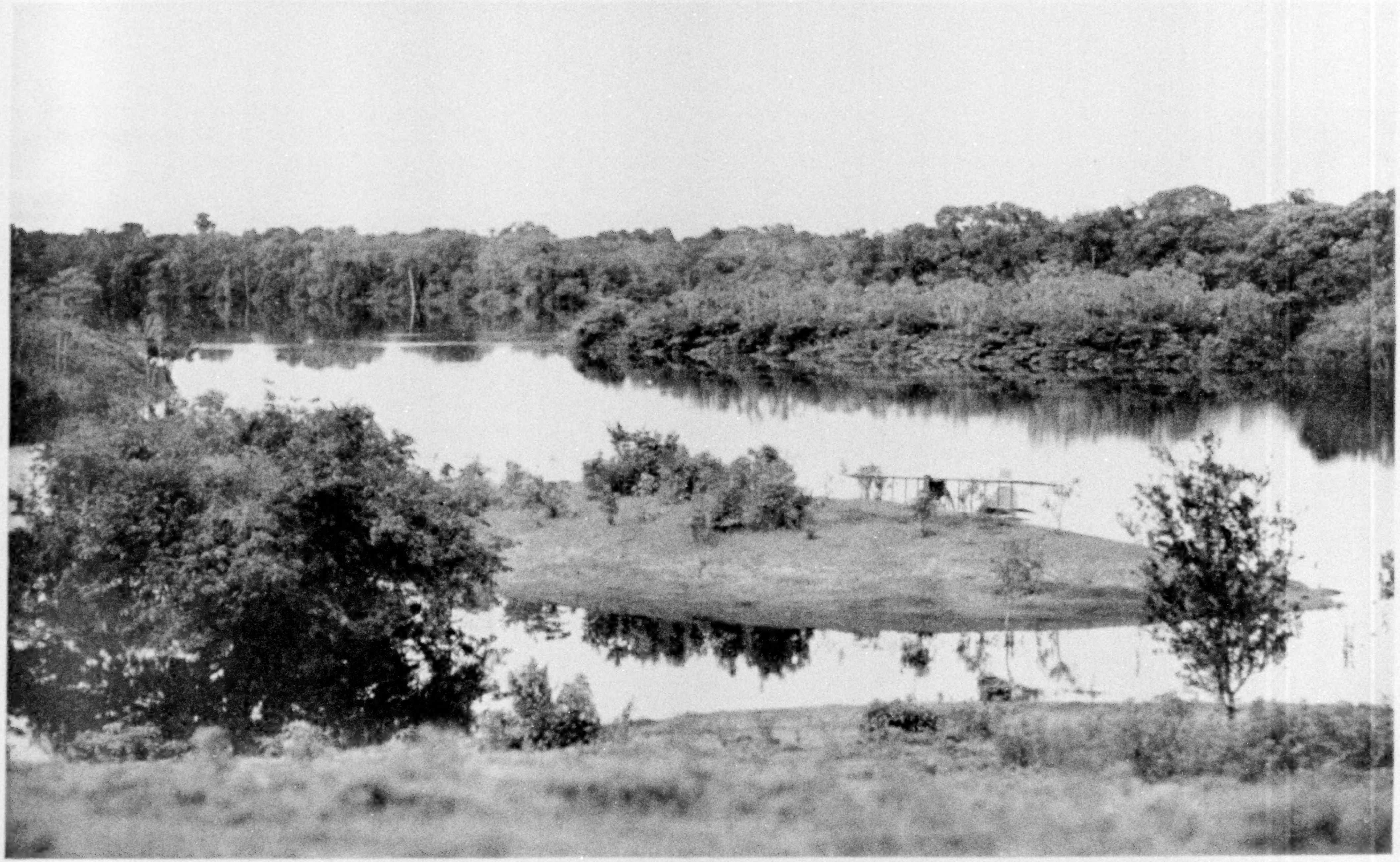
BRINGING IN AN ENORMOUS LOAD OF MANDIOCA ROOTS

Embarrassed by having her picture taken, this young squaw is fondling her youngster's hand to cover her confusion. The roots are quite large; they are scraped before being grated.



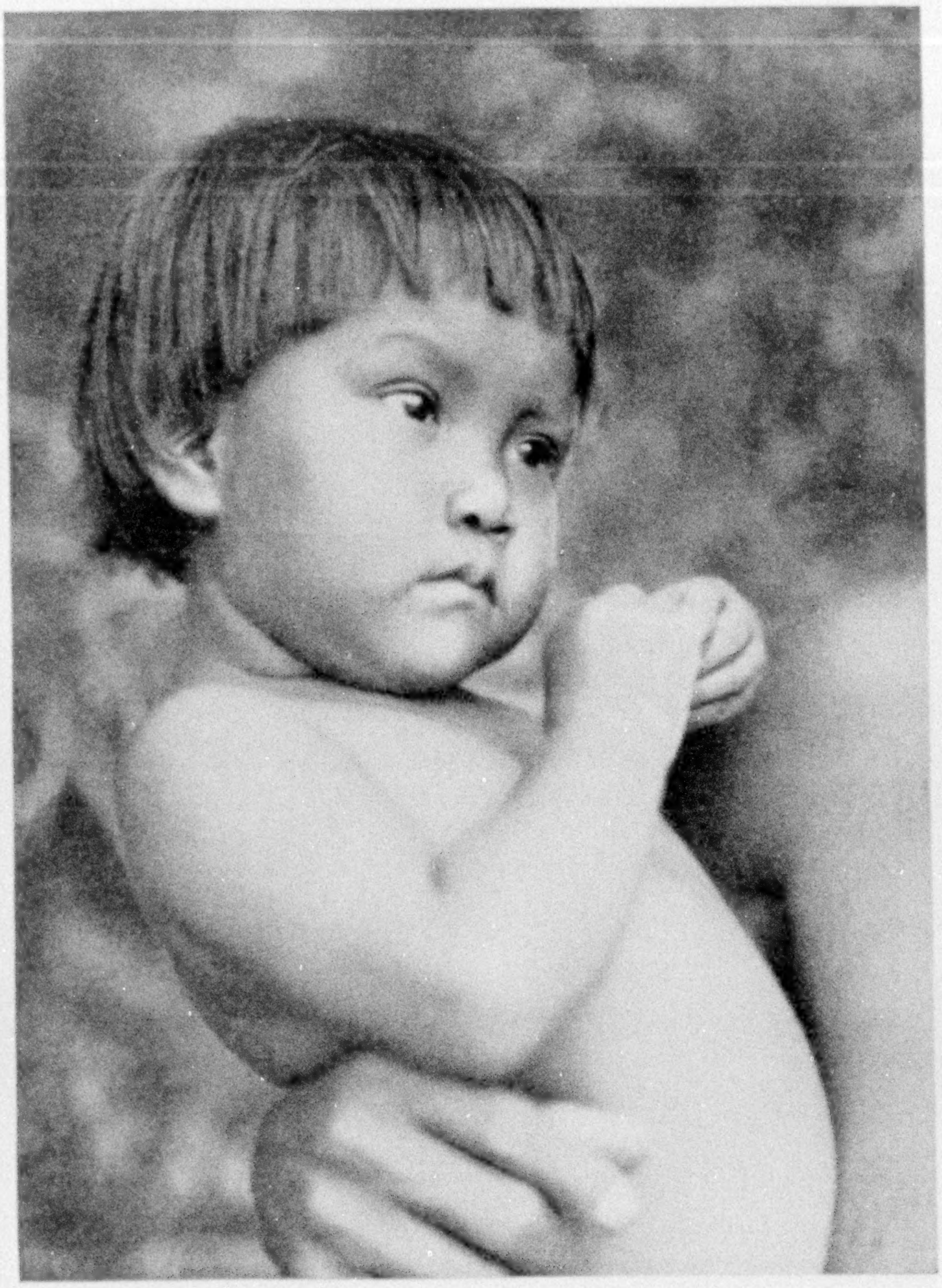
LATITUDE, O DEGREES, OO MINUTES, OO SECONDS

Looking down the Rio Branco above Cuarena. The Equator passes through the larger island. The launch is bound from Vista Alegre to Carvoeiro, down river, but is zigzagging, presumably to avoid sand bars. This photograph was made as the plane was flying back to Manáos, when the river was at low stage, late in March.



THE AIRMEN SUCCESSFULLY SOLVE A CRITICAL PROBLEM IN ACCURACY OF AIR NAVIGATION

Figures as to latitude and longitude were all the fliers had to locate the gas supply left by the steamer of the expedition in this inlet, halfway between Carvoeiro and Manáos. Knowing the latitude and longitude of Carvoeiro, they computed the distance and flying time necessary; when this time was up they did not see the cache. Flying for ten minutes more, they realized that they had overshot it, turned back upriver, and after ten minutes were rewarded by finding a small house and a hut up an inlet on the left, or north, bank.



A CHILD OF THE UPPER PARIMA

sketches the course of the Rio Parima was shown, with its bends, its waterfalls, stretches of rapids and islands; all tributary streams were shown, with their directions and the estimated percentage of flow added to the main stream. Indian clearings and huts, nearly always concealed from view from the river itself, but easily visible from the plane, were indicated.

THE RETURN TRIP IS SPEEDY

When the surveyors, a month and a half later, had pushed their canoes to the farthest attainable point and were halted by the narrowness of the river and high waterfalls, their only criticism was that our sketches were 8 degrees off in direction, due chiefly to airplane compass error caused by proximity of the engine.

Dr. Rice and his main party later pushed on up the Parima to its source. We left them at Kuleikuleima Rocks and began the return flight to Manáos, which was made in four actual flying days, in sharp contrast to the two months it takes to go upriver by steamer, launch, and dugout.

Two welcomes awaited us at Manáos. The English and Amercans of the town cheered us heartily, while the local police, officials of an entirely new city government, asked by what permission we landed there and whence we came. We were haled before the chief of police, then before the new governor, who, after due consideration, decreed that we might fly provided we notified the police first, a condition to which we readily agreed, now that our 12,000-mile flight to the headwaters of the Parima was an accomplished fact.

We made one more flight after that, to get pictures of the mixing of the yellow waters of the Amazon with the black waters of the Negro (page 378). Opposite Manáos the Negro is about four miles wide, and a stiff wind across stream made the surface choppy; on landing the "spank" of the hull across the wave tops proved too much for the many patches we had made on the boat, and some of the canvas strips came loose.

We immediately had the plane pulled ashore—for the last time. Its days of usefulness were over and our Brazilian flights were at an end.

# MARVELS OF MYCETOZOA

## Exploration of a Long Island Swamp Reveals Some of the Secrets of the Slime Molds, Dwelling on the Borderland Between the Plant and Animal Kingdoms

By William Crowder

*With Illustrations in Color from Paintings by the Author*

It was still dark when I made my way into the marshy maze. But soon, through the multitudinous openings in the emerald gloom overhead, the sky appeared like liquid splashes of rose-tinged silver, while the waning August moon seemed so tenuous that a breath could dissolve it.

Within the humid retreat the ferns and flowers and dense tangle of wildwood began obscurely to take shape through the shroud of misty shadows. Then, swiftly revealing itself in the increasing light of dawn, was seen in sharper outline that confusing chaos which is as typical of the temperate as it is of the tropic swamp.

Now was resolved a marvelous spectacle. On every side a bewildering riot prevailed; living forms reared themselves among the débris of dead and dying. . . .

This primeval picture of exotic exuberance lay not in some remote and far-away region of our globe, but within a minute's walk from the station of Millneck, on the easily accessible north shore of Long Island, less than 40 miles from New York City.

### A SEARCH FOR THE ODDEST OF LIVING THINGS

Although a swamp is a paradise for plants, the sweet Elysium and land of honey for many animals, it is, in the opinion of the average man, a dark and dismal reach—wet, insalubrious, filled even with the miasmatic vapors of death. The region seems not to be the birthplace of vigorous, pulsating life, but a vast and soggy graveyard, a treacherous sink wherein death and disaster are supreme.

Nor is this impression without certain cause. A swamp may well be said to have its moods. It appears at its best only to those in its confidence, revealing a quite charming aspect; to others it turns a sullen and forbidding countenance.

Here is maintained a constant ferment thrilling with life. Nowhere else, on land at least, does such prodigious fertility prevail. Even the sea, magnificent theater of life that it is, does not in certain aspects present a more extraordinary spectacle of the living drama.

It was not entirely from an overweening affection that I penetrated the reaches of my Long Island swamp while the rest of the world was asleep. My errand had been inspired by another and quite singular motive. I was on the way to watch the slime mold in its native haunts, and my objective was a certain old log, lying half-imbedded in the soft, soaked soil, which I knew to be harboring that oddest of living things.

Yet, absorbing as was my errand, I could not help drinking in the beauty of the surrounding scene in the gray light. Festooning the limbs and occasionally descending sheer to the earth, enormous vines hung suspended like giant swings or wrapped themselves like great garlands around the stately trees. On the trunks were expansive patches of greenish-gray lichens, oftentimes decorating their drab background of bark with fantastic figures.

### THE WHISPER OF MYRIADS OF MOVING CREATURES

Nearly every low-lying plant that bordered the shore of a brook carried a curious burden of short, slender blue sprigs, delicate and diaphanous, disposed variously over their leaves as well as their stems. Some of these sprigs exhibited an odd contorting movement, bending into tiny loops. Insects! But it was only

Photograph from William Crowder

IN THE HAUNTS OF MYCETOZOA

Although slime molds are usually dormant throughout the winter, a mild day will bring some of them into activity; whereupon they may be observed traveling over the logs (see text, page 424).

when the plants were closely approached that the multifarious hosts made certain their identity; for then the individuals detached and lifted themselves in a murmurous, rustling flight, the entire company dispersing in a glistening haze—a dissolving azure frost-cloud of somnolescent damsel flies!

The log I was seeking had lain on the spot for perhaps a century or more. It was now decayed throughout. Still, little evidence of this condition was manifest from the surface; only at the crumbling of its one visible end and in places where the bark had long since fallen away were there traces of its disintegration.

From the base, which was of a diameter so great that it reached almost the height of my waist, to a point where the trunk tapered toward what had once been the tree top, the cypress was nearly concealed from view by accumulations of detritus and a swaying forest of ferns, some of whose fronds, still laden with dew, looked like silvery plumes.

In one section the bark was mostly gone, and the surface of the exposed smooth wood was punctured with numerous holes—the entrances to the galleries of wood-boring beetles and other insects.

What a teeming population this fragile tenement contained! Applying my ear to

Photograph from William Crowder

SEARCHING FOR SLIME MOLDS

These two collectors are watching mycetozoa making their way over a sheltered log. A pile of wood like this—old, weathered, and in a moist situation—is invariably the habitation of numerous species of slime molds.

the surface, I could hear a faint rustling within, a ghost whisper of myriads of tiny creatures—white ants scraping, enlarging, extending their corridors. Day and night, summer and winter, the tread and toil of the tireless workers continue; nor do their activities abate until the trunk is honeycombed and the frangible shell breaks apart from its own weight; whereupon the termites migrate to a more propitious shelter to continue their destructive labors.

### WATCHING THE SLIME MOLDS GROW

Beyond these superficial details there was little in the appearance or the situation of the log to distinguish it from a hundred others lying about in the swamp.

But my business had to do only with that part of the log which was partially concealed by undergrowth and deadwood.

To clear away the plants and incidental débris was the work of a few seconds. Behold! Seldom ever before had such a gorgeous sight startled my unexpectant gaze.

Spreading out over the bark was a rich red coverlet, like the pile of a bright Persian rug, consisting of thousands of small, closely crowded, funguslike growths. They were the objects of my quest—myxomycetes or mycetozoa (see Color Plate XV).

A colony of these tiny organisms extended in an irregular patch over the top and sides of the trunk, covering an area nearly a yard in length and slightly less in breadth.

To such a soft, velvety coat a touch or two was irresistible; but on the merest contact of my finger a cloud of spores arose, settling upon the barer portion of the bark as an impalpable film of reddish dust and leaving on my skin a tinge of ruby russet.

### EACH UNIT RESEMBLED A MUSHROOM

I brought my powerful pocket lens to bear upon the dainty individuals. Each unit, although actually less than a quarter of an inch in height, resembled, in the focus of my strong glass, a miniature morel, a small mushroom, though more marvelous than any I have ever seen.

Of the total height, a third was taken up by a slender stalk which at its base was attached to the bark. Surmounting this stalk was a cuplike expansion, which in turn supported a large, dense, elongated cluster of tangled threads—the sporangium (spore case).

That was all. Simple in form, in detail unadorned; yet how impressive! In the case of some individuals the sporangium was immature, as was evidenced by the filmy, iridescent membrane inclosing them. In others this membrane had burst and was still hanging in shreds, disclosing the compacted mass of spores within the network—indescribable in tint, in translucent texture, and in graceful dignity of form.

For want of a better term, I have called their color *red*. It was one of those rare reds, such as is produced by Nature only in her most delightful moods, as in the rosy reflex of a winter's dawn or in the evening glow that in summer oftentimes transfigures the world as well as the face of the setting sun.

I doubt if any other natural object has a color precisely like these slime molds. It is a red that is almost purple, yet not purple; it is a nuance of red, intriguing, ineffable, that leaves one guessing whether he sees a vibration of color or is receiving only a hazy, illusive impression.

### SLIME TRANSFORMS INTO SPORE-CASES

At one edge of the colony the slime molds were less crowded and, it seemed, less mature. In this place was visible a thin patch of glair, about the size of the palm of my hand, which glistened in the shadowy retreat like a filmy layer of silver-leaf (see page 443).

This patch of slime was significant. It was the last trace of a much larger portion that I had been watching for several days. Even had its nature been unknown to me, I should readily have divined the reason for the diminution of its size because of an event that was now taking place before my eyes — the long-anticipated transformation of the slime into the colorful colony of pretty sporangia just described.

When, a few days earlier, I had been prowling through the swamp, chance brought me upon the log. At that time it was mostly bare over the area now occupied by the slime molds, except for an exceedingly delicate and almost invisible pellicle of a creamy texture which caught my eye.

### THE MASS WAS MOVING

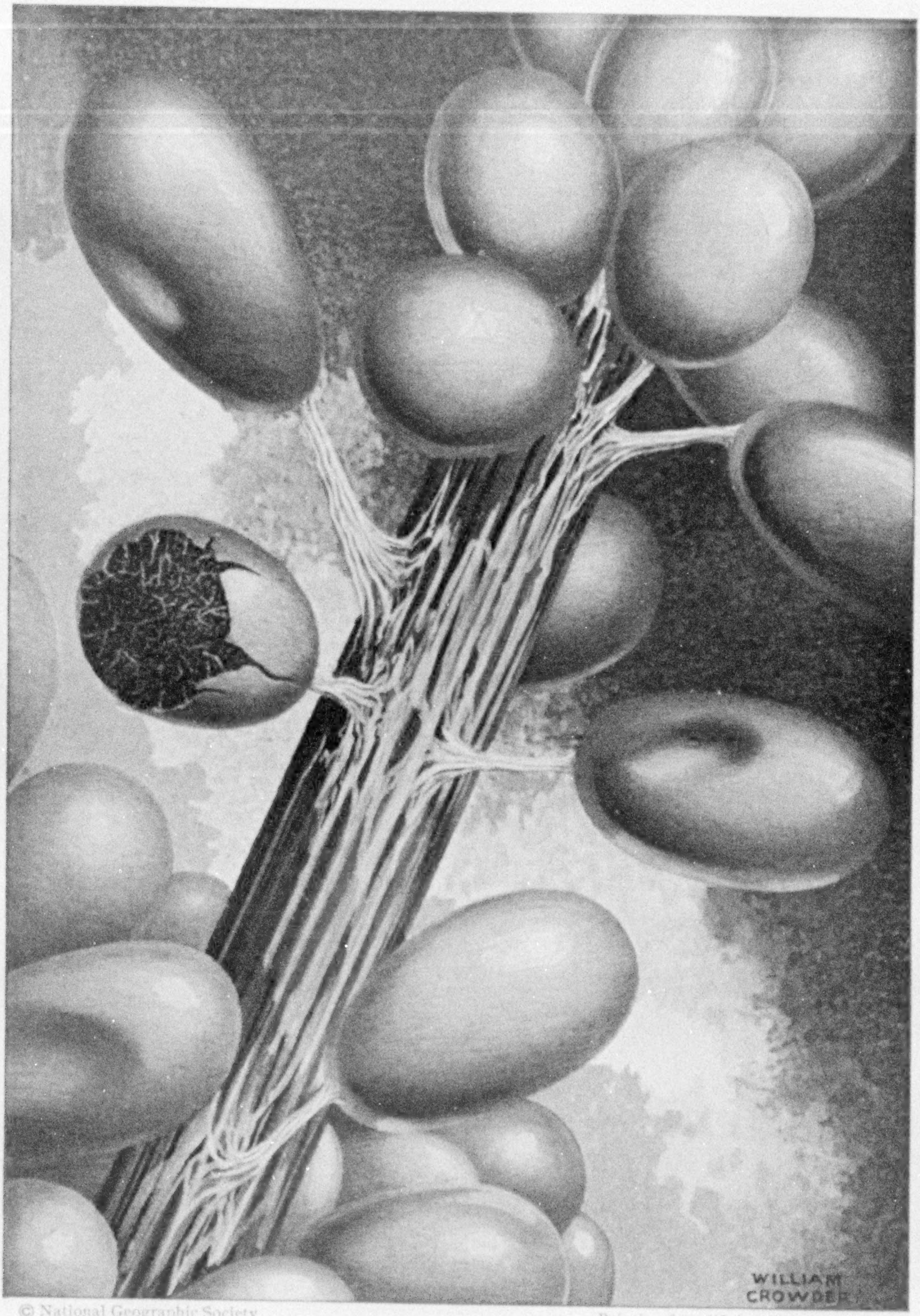
After studying the filmy mass I had become aware that it was moving. Spreading out fan-shaped, it advanced its borders almost as slowly as does the hour-hand of a clock. The rest remained stationary and was connected by a cordlike vein that led into a minute crack in the log.

As the advancing edge seemed to be the only part in motion and the area of the mass meanwhile was increasing, it was evident that the materials for this augmentation were coming from within the log by flowing through the vein.

I realized that a migration was taking place—that this curious mass of glair, which normally lives and grows in darkness in moisture-laden tissues of decaying wood, had arrived at the period of its existence when it must reach the outer air and light to reproduce and to enhance the favorable distribution of its spores.

During my visits on succeeding days, the only observable changes had been in the increasing area of the slime and in the shifting of its location. It had wandered, crossed and recrossed its path on the tree trunk, leaving a well-defined trail of organic refuse over its course. Yet slowly and continuously it had kept on the move, like some lost creature uncertain of its way, groping aimlessly about, apparently without other purpose than to follow the most fortuitous route. But in none of its excursions did it travel more than a yard along the length of the log.

Finally its traveling ceased and it began to separate into pellucid particles somewhat smaller than rice grains.



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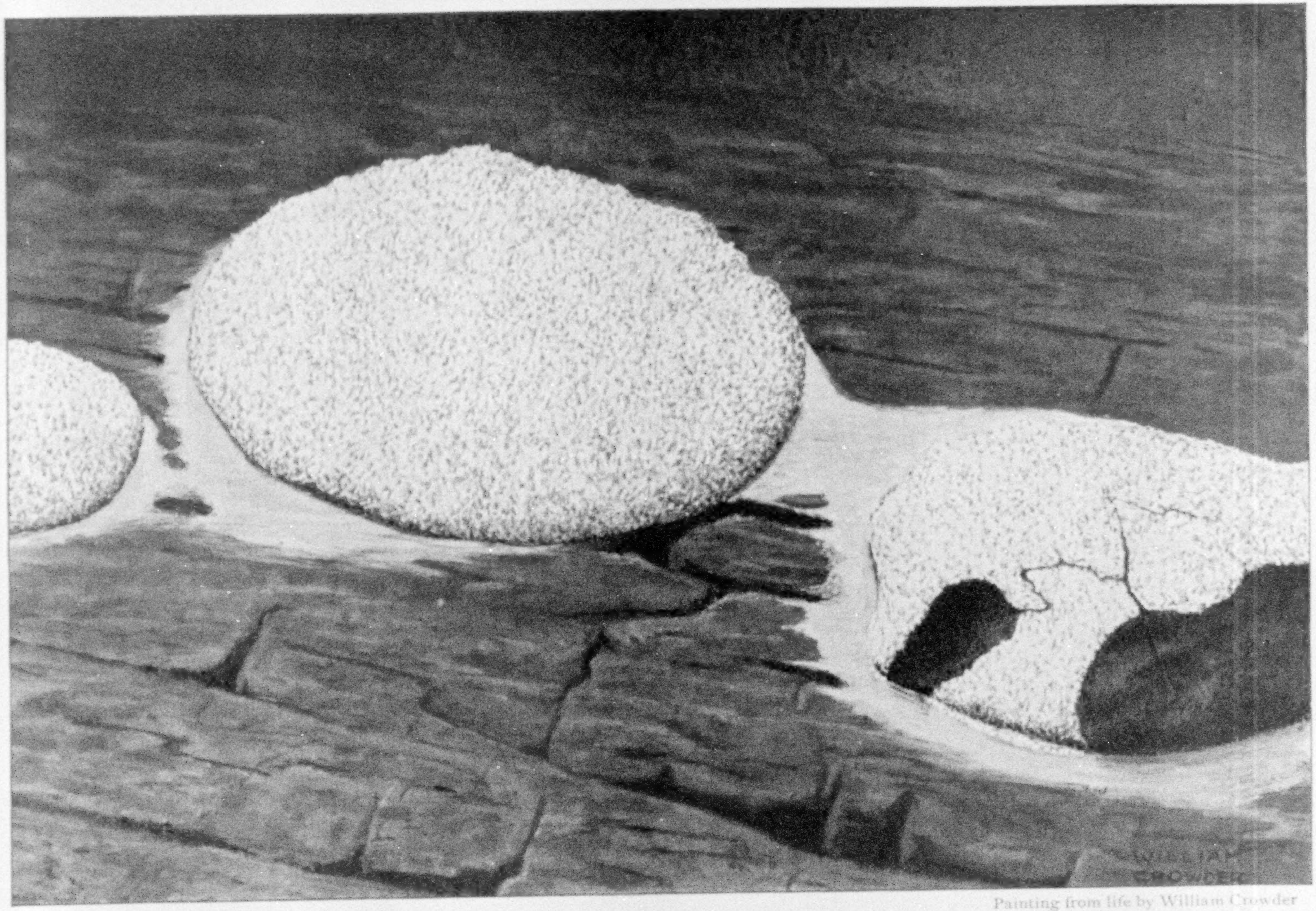
A SPECIES OF SLIME MOLD FOUND THROUGHOUT THE WORLD

The delicate, funguslike organisms known as myxomycetes or mycetozoa are common in all the moist, wooded regions of the earth. Whether they are to be classed as plants or animals is a question upon which scientists are not yet agreed, although the organisms have been the objects of study for nearly 200 years. The above species is the Leocarpus fragilis, magnified 30 diameters.



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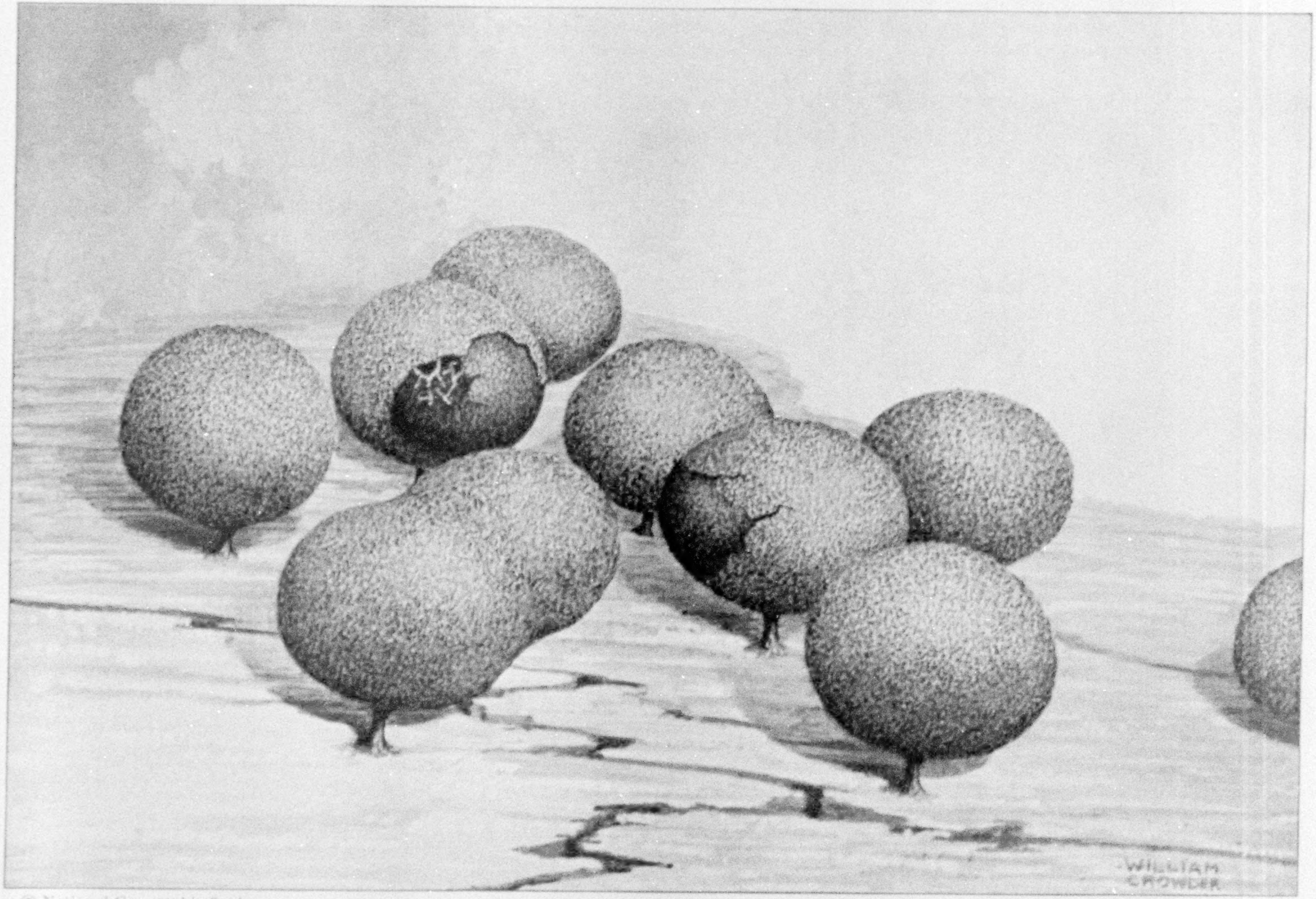
THERE ARE MORE THAN 500 SPECIES OF SLIME MOLDS

With few exceptions, the sporangia (spore cases) of slime molds are seldom more than a quarter of an inch in height, but while their minuteness renders the individuals inconspicuous, the habit of grouping into colonies oftentimes makes them an imposing spectacle. This species, Fuligo septica, enlarged 1½ diameters, is world-wide in distribution.



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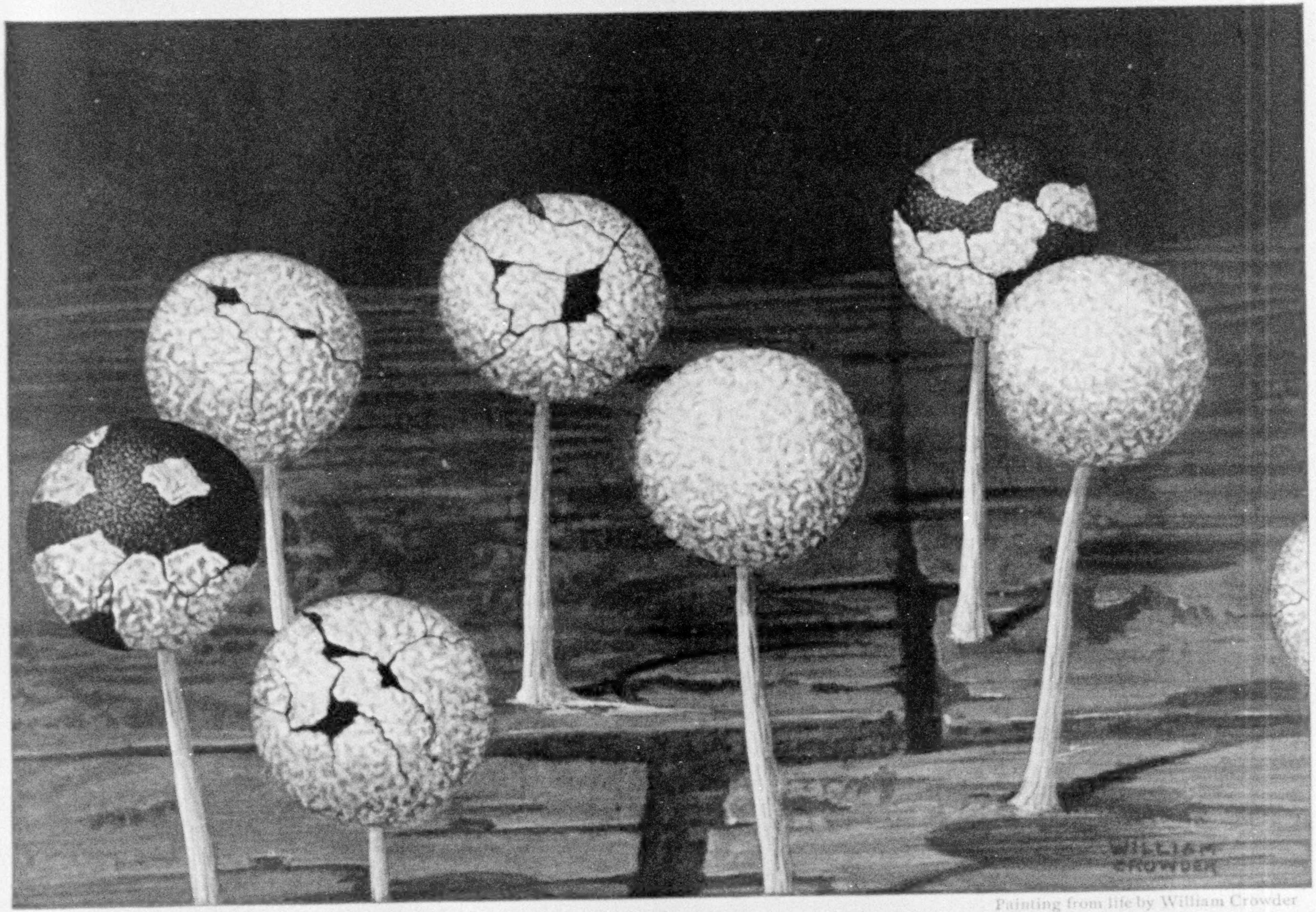
SPORE CASES OF BADHAMIA PAPAVERACEA, ENLARGED 40 DIAMETERS

The spore is to the slime mold what the seed is to the higher or flowering plants and the egg to the higher animals. Like the spores of mushrooms (see the National Geographic Magazine for May, 1920) and of ferns (see the National Geographic Magazine for May, 1925), the spores of slime molds are microscopic bodies which germinate after coming into contact with water. But unlike the spores of true plants, which develop directly into other plants, the spores of the slime molds produce first an organism, a small colorless speck of protoplasm, which in a short time assumes an elongated pearlike form, carrying at its smaller end a thread or lash, which it whips around in the water somewhat in the manner of a traction propeller, thus carrying the microscopic organism into moisture-laden food precincts.



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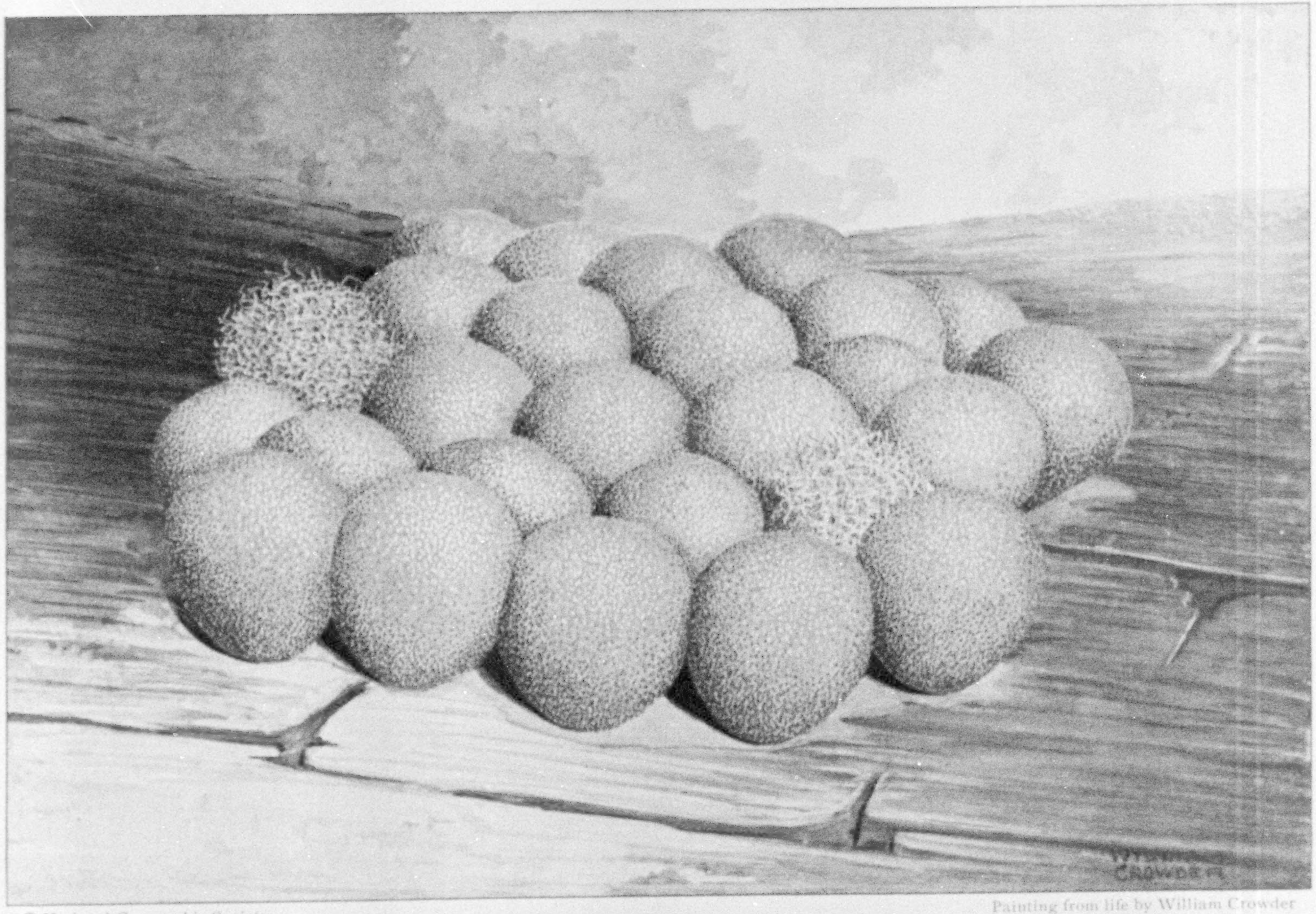
A MEMBER OF THE PHYSARUM FAMILY

Individuals of this species (globuliferum) resemble tiny beads of porcelain or pearls strewn over dead leaves or wood. Enlarged 40 diameters. The sporangia of certain others of the same family are an intense black and nod at the end of hairlike stalks, reflecting from their glossy surface the blue of the sky; still others collect in groups and strike the eye with a startling shade of scarlet, staining the bark on which they appear like a splash of blood.



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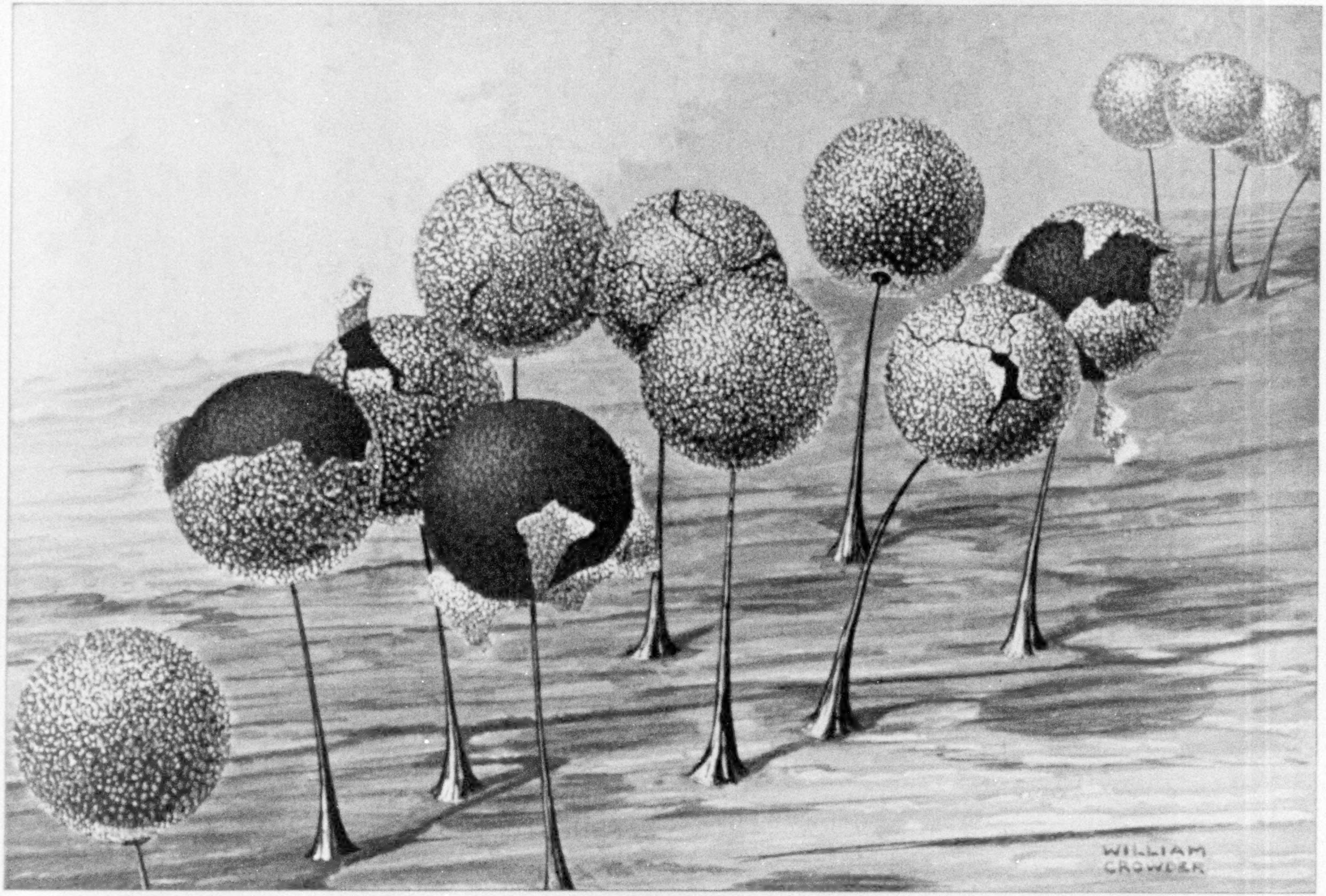
TRICHIA PERSIMILIS IS FOUND THROUGHOUT THE NORTHERN WORLD

There are two distinct phases in the life history of slime molds—the vegetative and the reproductive. The vegetative phase is known as the plasmodium of the species. The substance of the plasmodium resembles the white of an egg in consistency, is slippery to the touch, tasteless and odorless. This specimen is enlarged 40 diameters.



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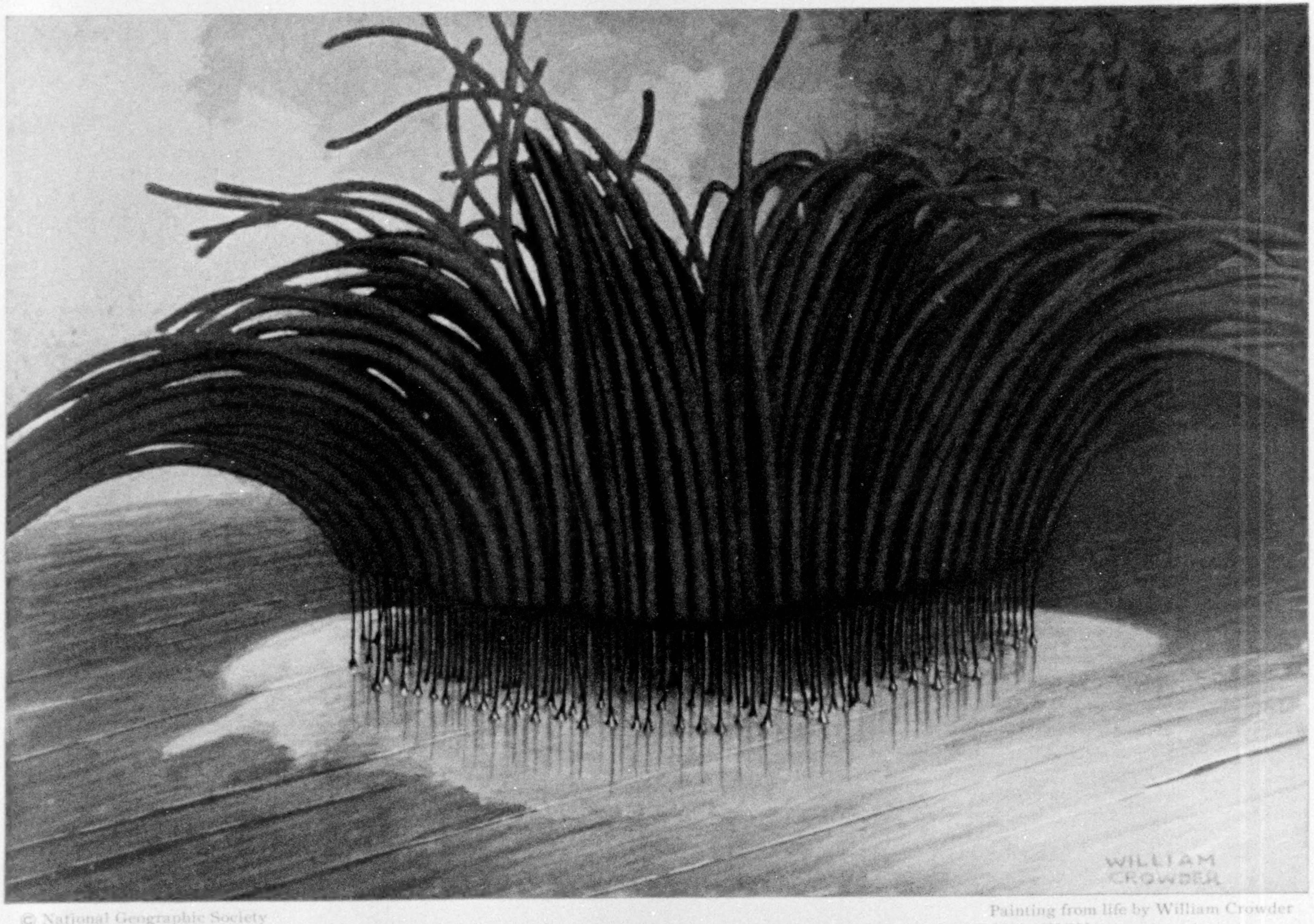
LAMPRODERMA ARCYRIONEMA OCCURS IN LARGE COLONIES ON BARKLESS, DECAYING LOGS. ENLARGED 40 DIAMETERS

In their plasmodial state (see under Color Plate V) slime molds are found in damp situations, and in warm weather they spread over moist surfaces and creep through cracks and rotting bark.



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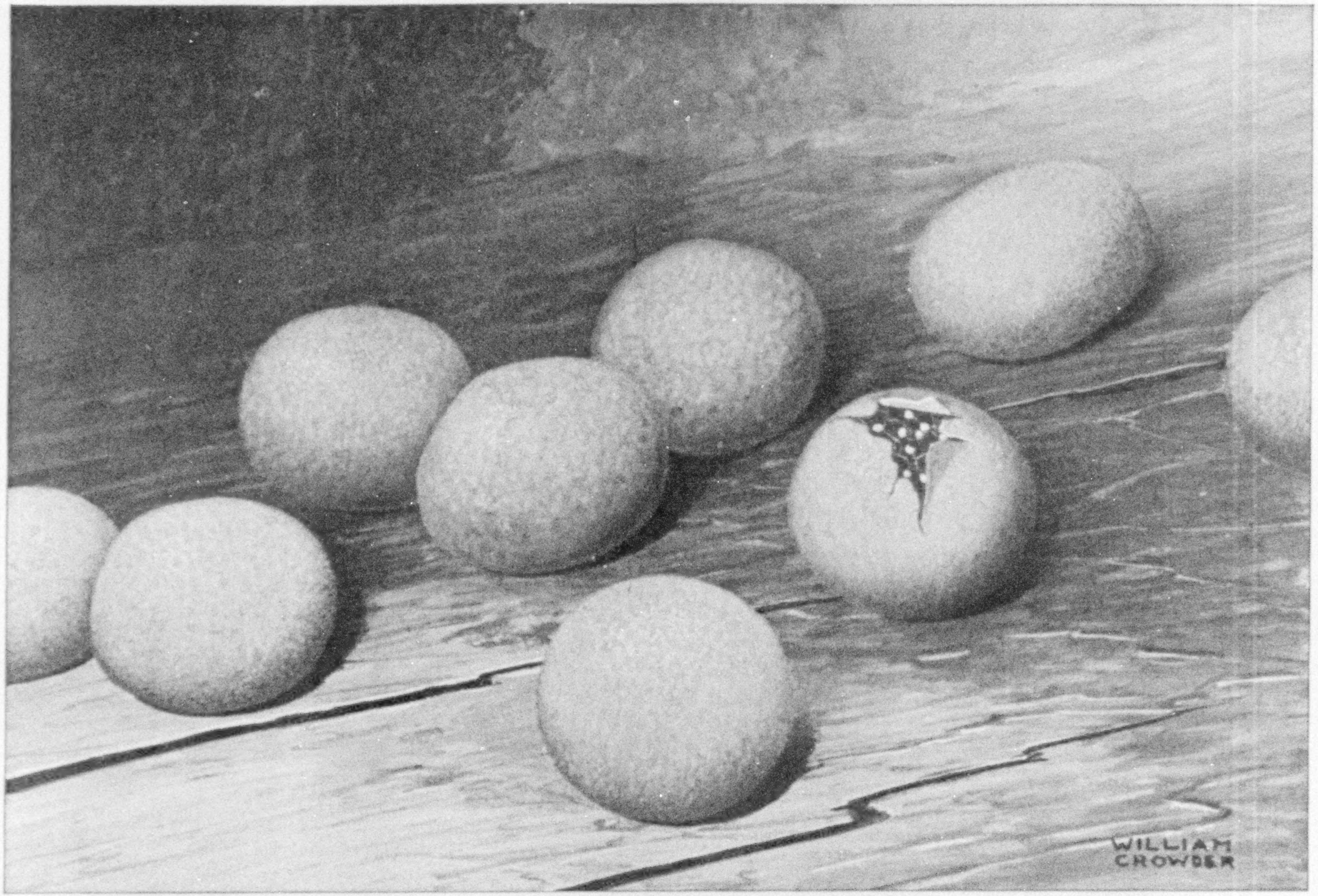
THE CHASTE ELEGANCE OF THIS SLIME MOLD'S PROPORTIONS COMMANDS ADMIRATION

Stemonitis splendens is one of the commonest of the mycetozoa. Its slender, dusky sporangia sometimes reach a height of an inch or more, and resemble miniature attenuated spikes of the reeds known as "cat-tails." A good magnifying glass is needed to resolve the finer details of the intricate network of Stemonitis. Its loose and gauzy labyrinth of plasmodium (see under Color Plate V) has a weird charm and unearthly beauty all its own. Enlarged 10 diameters.



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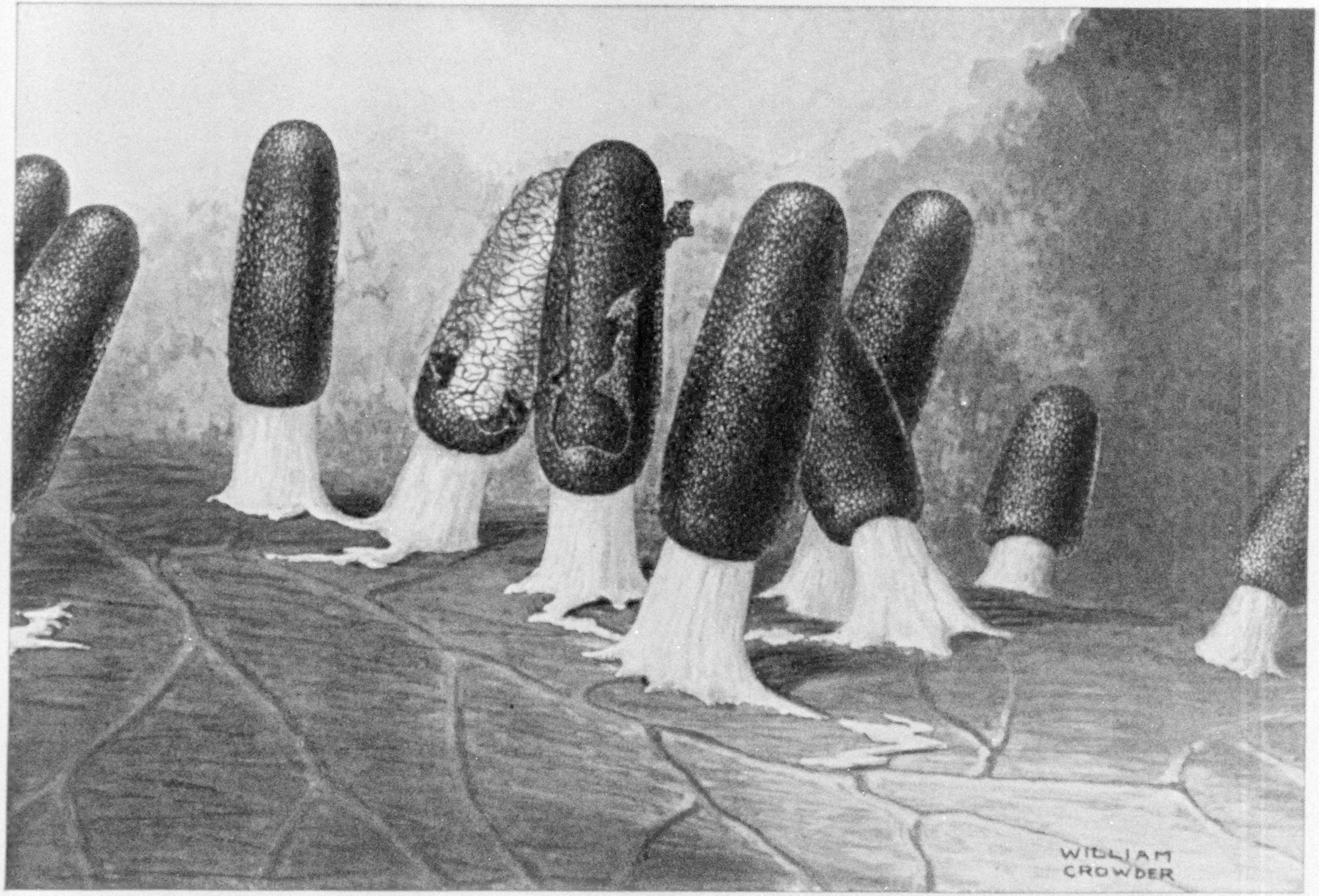
PHYSARUM LATERITIUM RESEMBLES CLOSELY THE FAMILIAR "PUFFBALL"

The plasmodium of slime molds (see under Color Plate V) shows marked "irritability," avoiding strong light and seeking moisture and food. It frequently surrounds soft organic substances and completely digests them. Physarum lateritium is a cosmopolitan species, being equally at home in New York, Pennsylvania, Colorado, Ceylon, Java and Brazil. The species is magnified 50 diameters in this painting.



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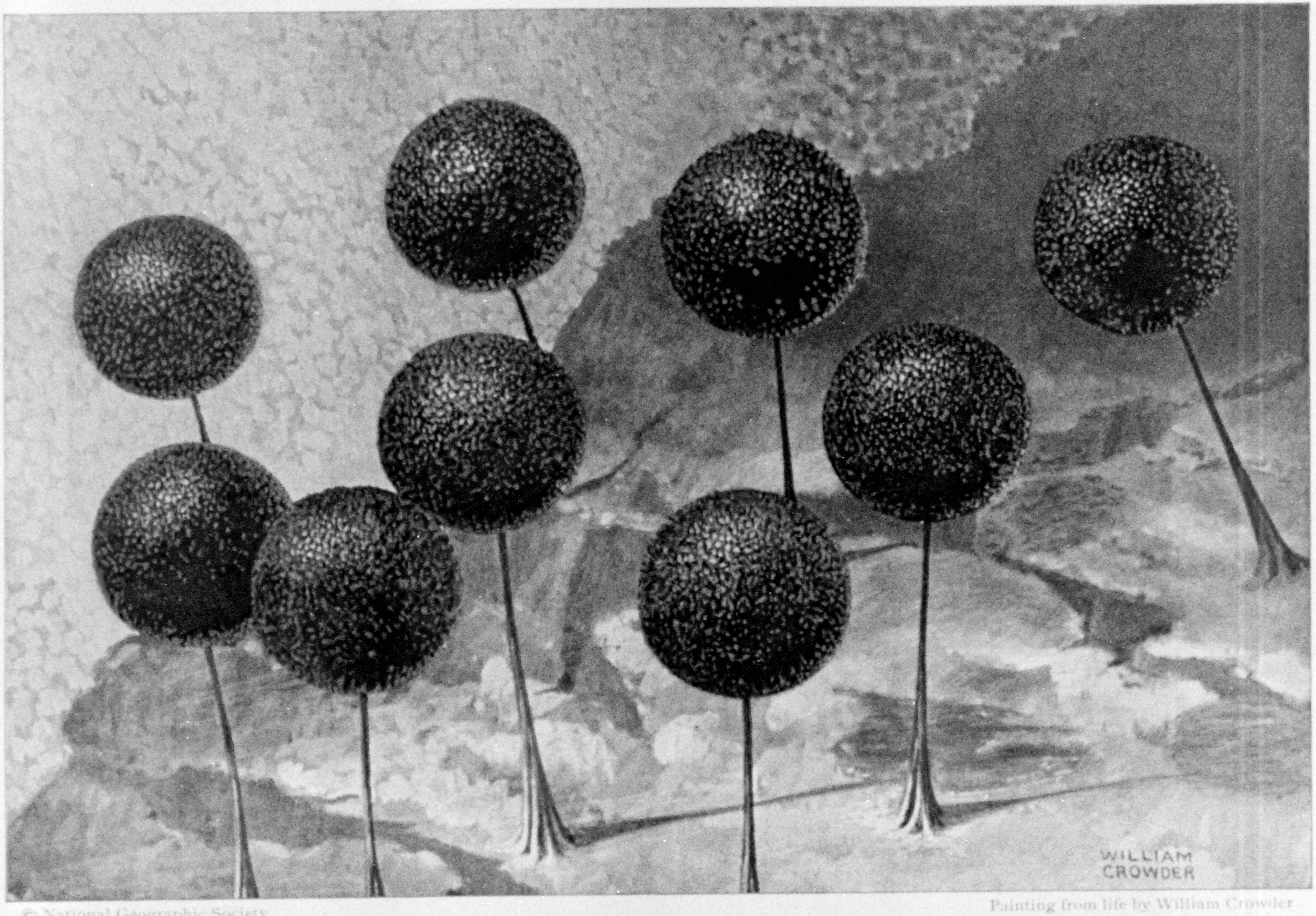
THE IRIDESCENT HUES OF DIACHEA LEUCOPODA RIVAL THE TINTS OF A PEACOCK'S FEATHERS

This lovely species of mycetozoa is not uncommon in the Eastern States, but is rare west of the Mississippi. It is easily identified by its white stem. Enlarged 75 diameters.



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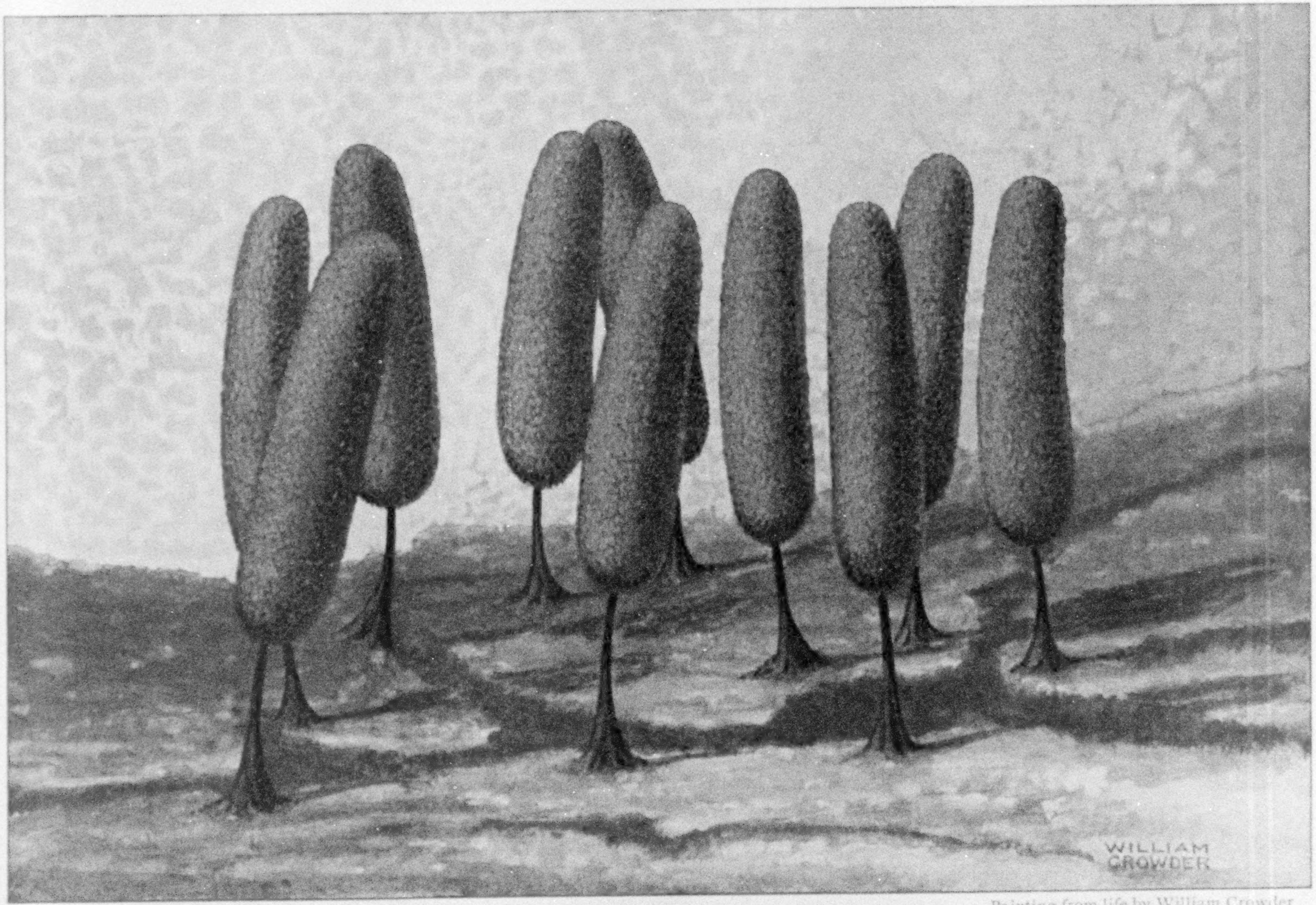
A GLITTERING SKIN IDENTIFIES LAMPRODERMA VIOLACEUM

This species sparkles in the breeze like the waters of an agitated pool in strong sunlight. It is our commonest slime mold, and is to be found late in the fall on decaying sticks and logs far and wide. Enlarged 40 diameters.



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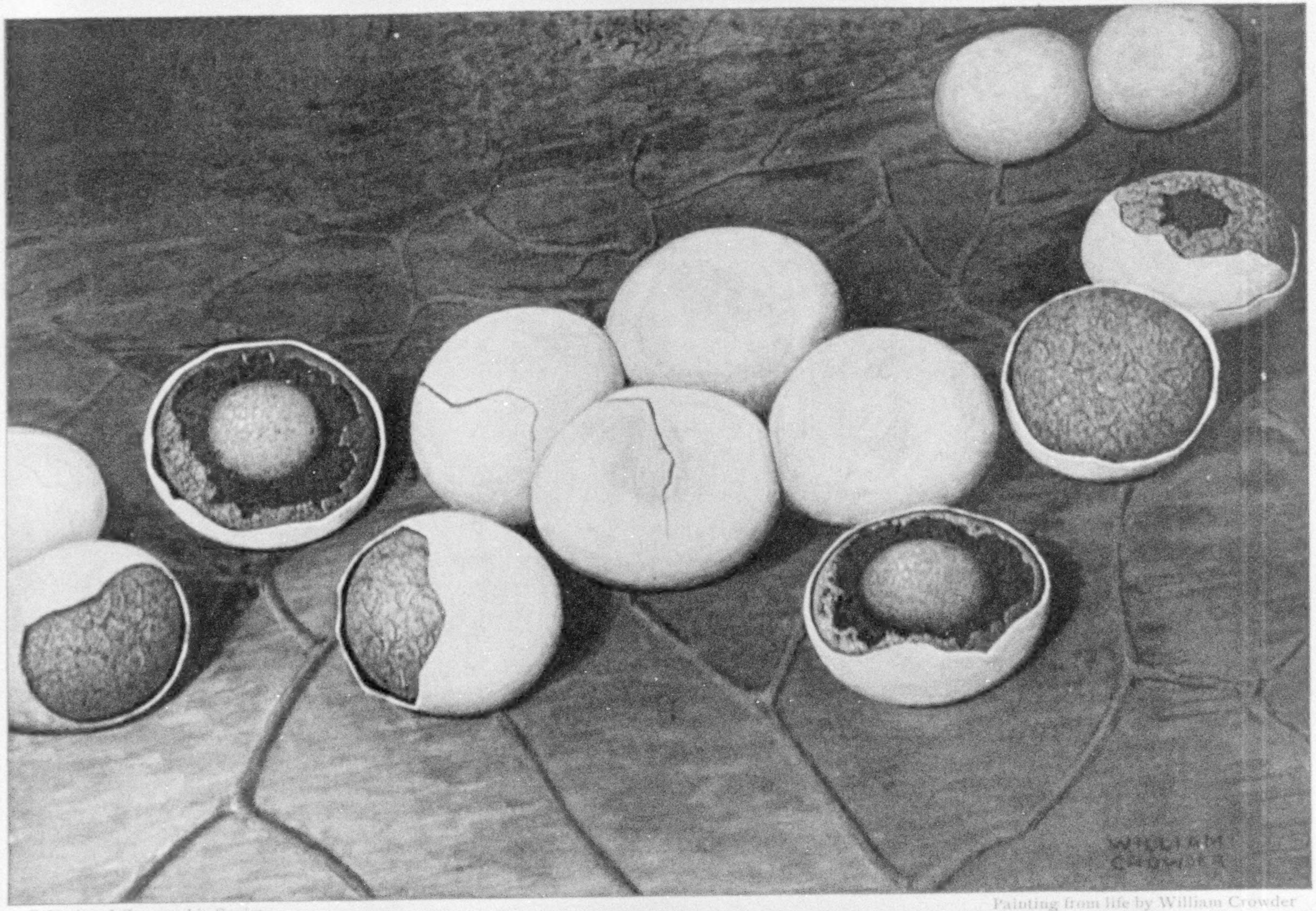
COMATRICHA PULCHELLA IS PROBABLY WIDELY DISTRIBUTED BUT IT IS RARELY COLLECTED

The sporangia of this species are very minute, being less than one-twentieth of an inch high. Magnified 30 diameters.



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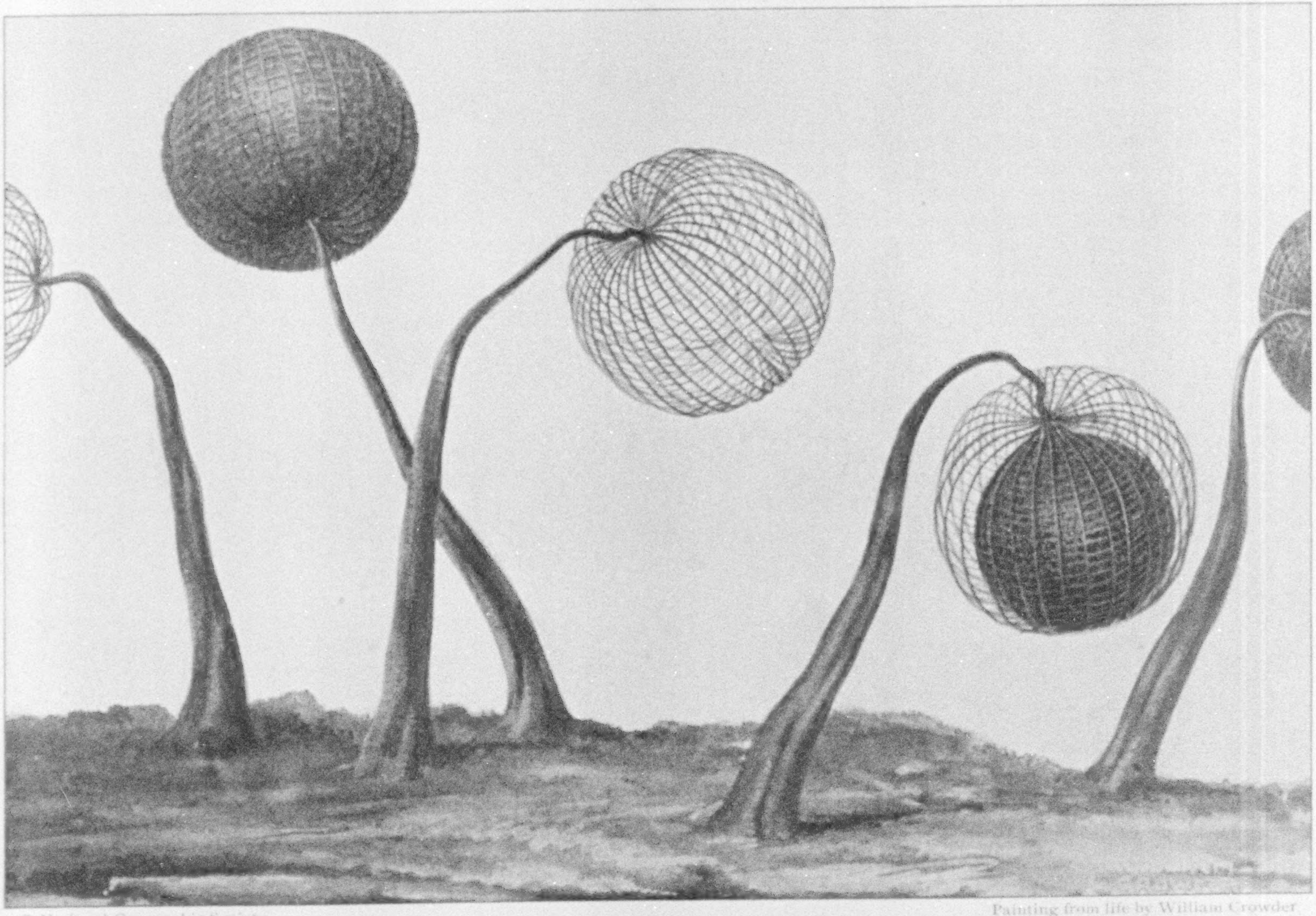
BEAUTIFUL DIDERMA TESTACEUM IS FOUND THROUGHOUT THE UNITED STATES

Most of the specimens of this slime mold in our Western States are found on dead oak leaves; in the East, they not infrequently gather on moss. When fresh this Diderma is easily recognized by its delicate pink color. Older specimens become white. Enlarged 40 diameters.



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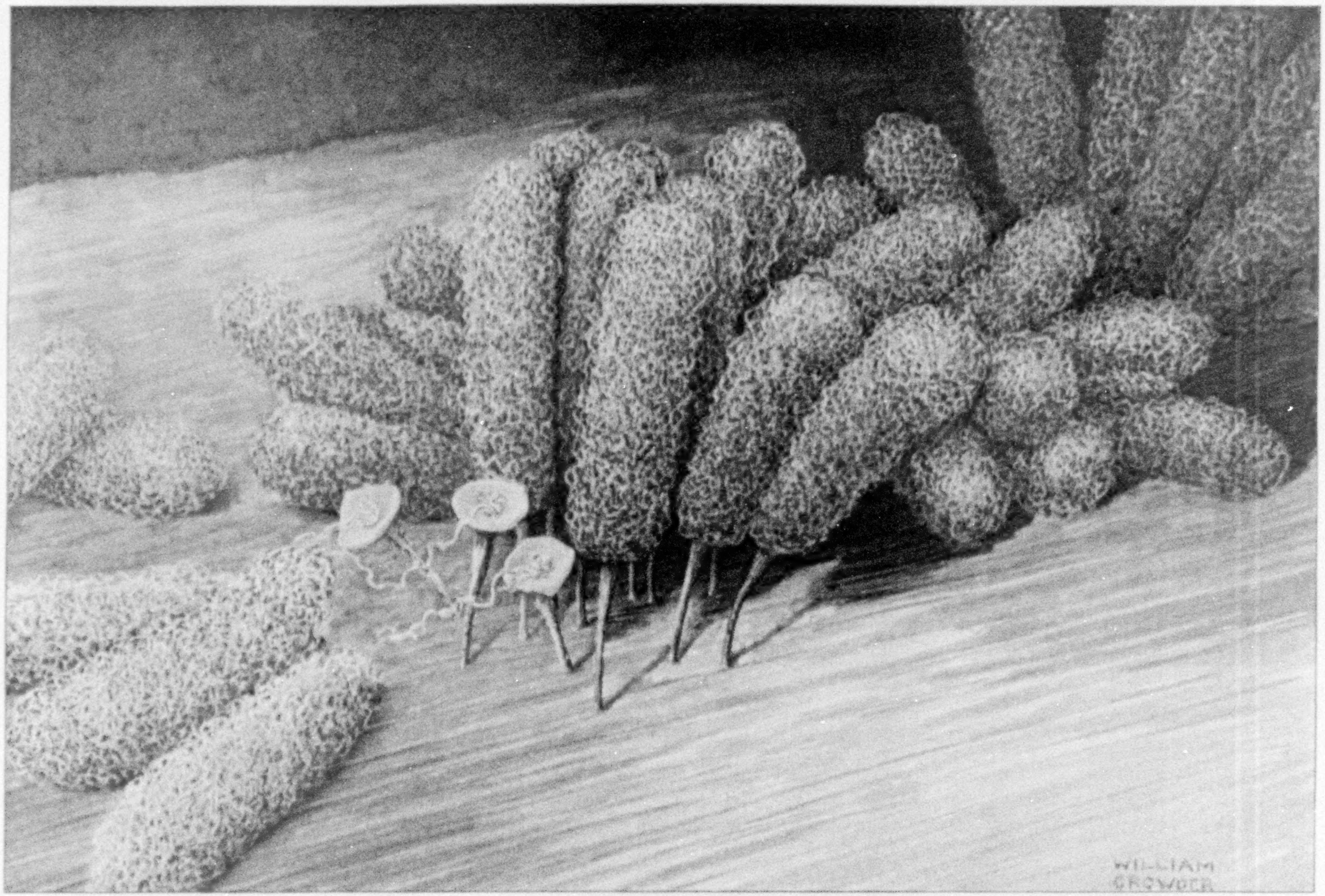
WONDROUSLY WROUGHT DETAILS DISTINGUISH THESE ORNATE STRUCTURES

The spherical sporangia on slender stalks are like tiny baskets, the ribs and stays of which are represented by a latticelike wall of strange diametric design. The spores, a rich cinnamon brown oftentimes reddish in color, at first fill the little baskets to capacity, but eventually they make their escape through openings in the wall. At every slightest breath of air the baskets sway and jostle, strewing their burdens, pepper-box fashion, in all directions. This is Dictydium cancellatum, magnified 40 diameters.



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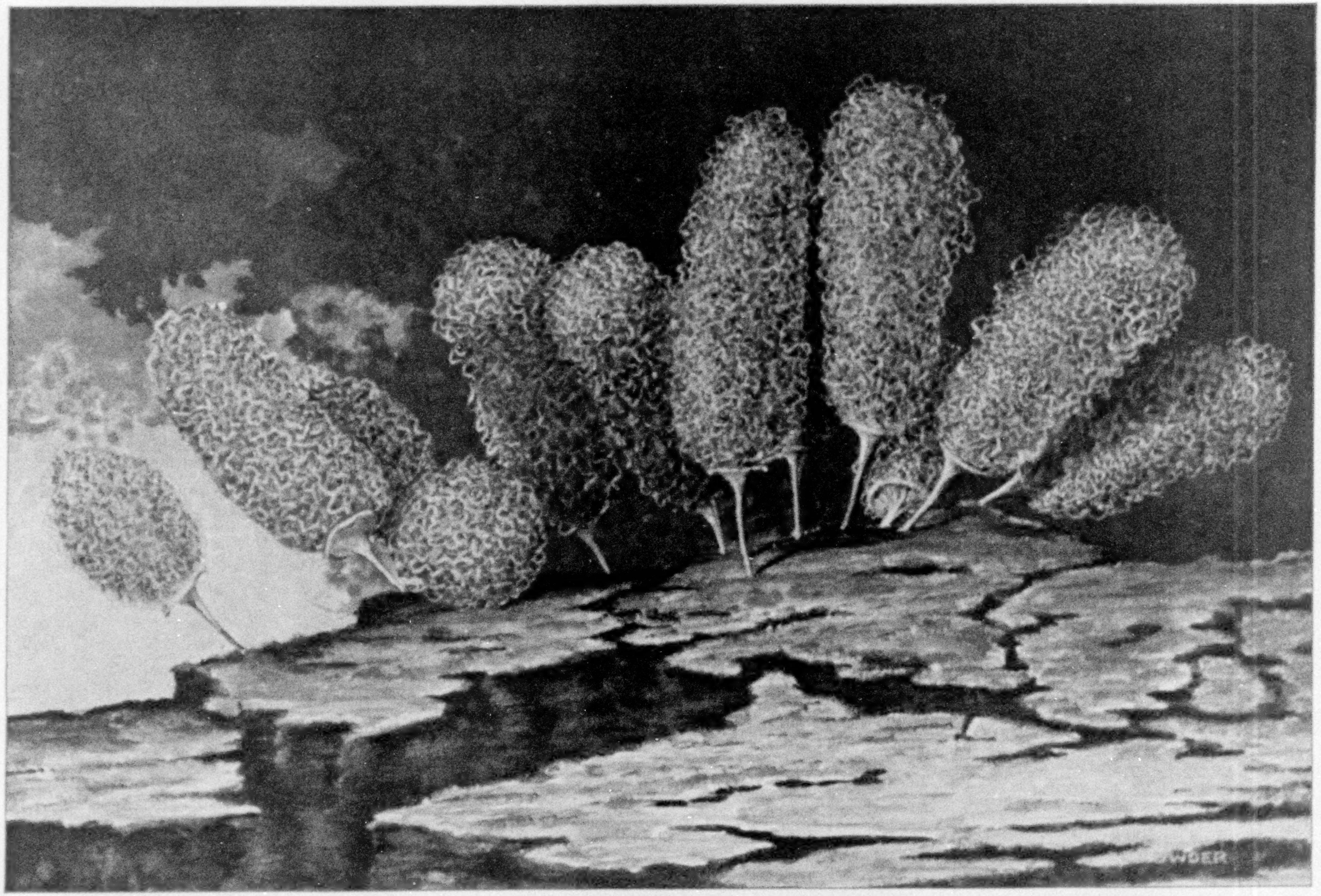
ARCYRIA FERRUGINEA, ENLARGED 18 DIAMETERS

Groping, streaming, pulsating, the silvery protoplasm of the Arcyria family of slime molds shoots its ghostly threads from moisture-laden logs and wanders over the bark to its place of development into one of the loveliest of natural wonders in miniature.



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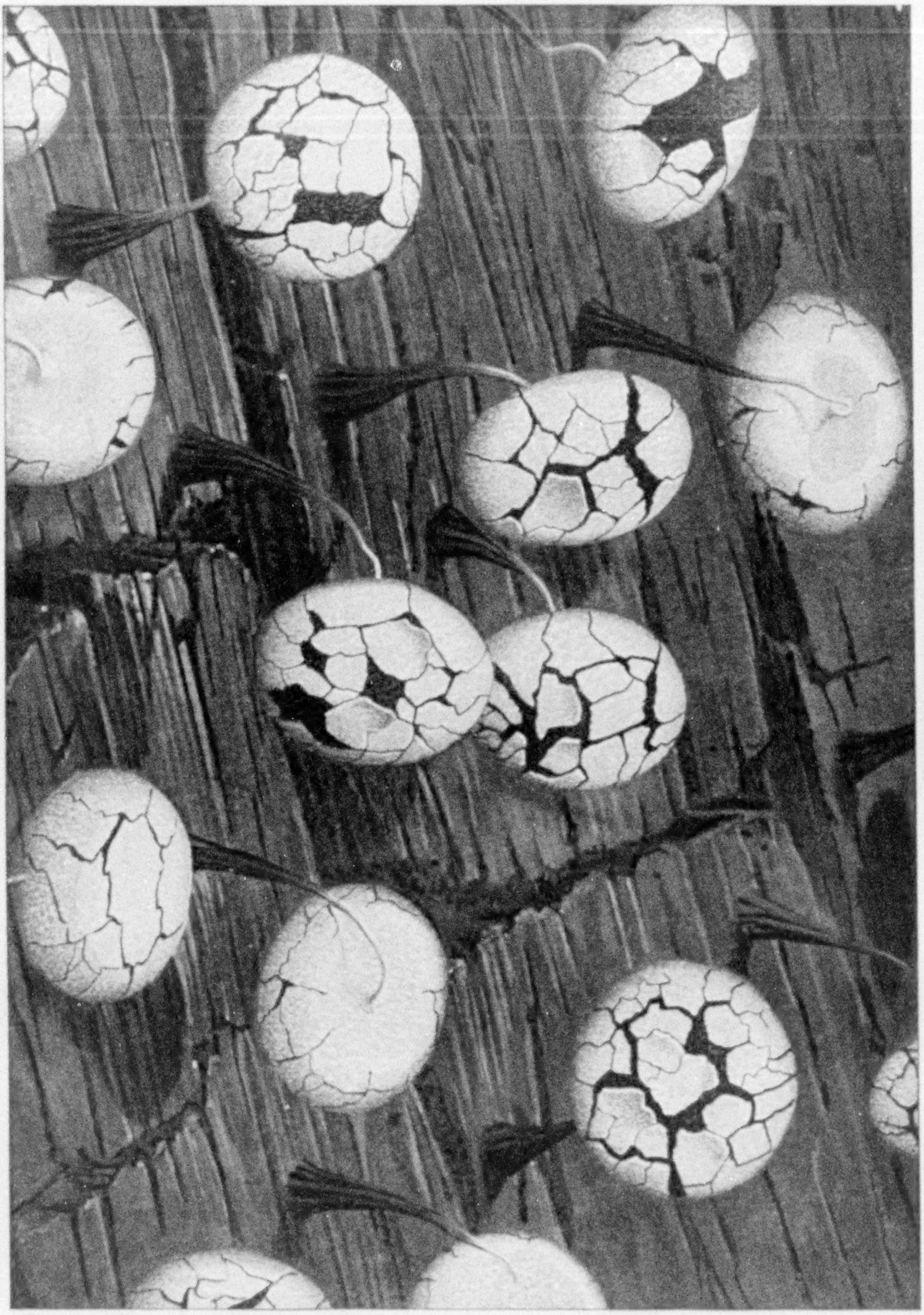
ARCYRIA DENUDATA IS THE COMMONEST SPECIES OF ITS GENUS (SEE ALSO COLOR PLATE XIV)

This slime mold is equally at home as far north as Alaska and as far south as Nicaragua. Enlarged 18 diameters.



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SPECIMENS OF PHYSARUM VIRIDE, MAGNIFIED 50 DIAMETERS, SUGGEST EGGS AND GOLF BALLS ABOUT TO PEEL

In the case of many of the slime molds the life history of the particular species has not been completely traced. They provide a subject which invites the attention of the student of zoölogy no less than that of the inquiring botanist.

This change came at dusk on the day preceding the dawn of our present inspection, and it came at an unseasonable hour, when I was not equipped with a light and when the fast-approaching night began to cloak in darkness the most interesting activities of this curious organism.

### THE SILVERY LIQUID BREAKS UP INTO MINUTE PEARLS

My early return to the locality was not without its compensation, for an entire colony of sporangia had sprung up over night. But I arrived almost too late to witness the manner of the transformation; for, even as I looked, the silvery splash of liquid light that still remained on the log began to break up into a compressed group of minute pearls. The globules at first were creamy white, but gradually they assumed a cast of delicate pink, and with the change in hue came a slow, though definite, alteration in the form and size of each unit.

The tiny gems were strewn in shapeless clusters of a single layer, as if the contents of some fairy treasure casket had been spilled upon the bark. In several instances they were so closely crowded that the soft, yielding bodies arranged themselves in geometrical order, like the hexagonal cells of a honeycomb or the facet eyes of giant dragon flies.

Eventually a more fundamental change occurred. By degrees the developing sporangia increased in dimension along their vertical axes and began to resemble short cylinders standing on end, the topmost part of each being slightly enlarged.

As the columns rose, gathering their substance from the surrounding slime, the globules topping them became less marked, until they completely disappeared when each little sporangium had reached a height equal to three times its diameter.

### THE INSECT WORLD GOES INTO ACTION AGAINST THE OBSERVER

Before this stage was reached, however, the sun was more than four hours old and the oppressive atmosphere of the swamp began to assert itself.

The rising temperature set the insect world in motion. Wasps and bees hovered uncomfortably close, respecting my person only while I was puffing vigorously at my pipe. Occasionally the sting-bearers would crawl over my face and hands, and although they made no attempt to attack, their presence was distracting, lest I should forget and make an incautious movement.

The mosquitoes, the gnats and buzzing flies, on the contrary, considered my welfare not at all; whole tribes took telling toll of my lifeblood.

Round about, a more attractive crowd appeared. Gaudy butterflies settled lazily upon brilliant blossoms, uncoiled their siphons and thrust them deep into the hearts of flowers. A great moth, startled from its hiding place, flick-flacked its way here and there excitedly, the metallic blue of its wings flashing in the shade like a fragment of the sky.

Grazing the ground in its characteristic low flight, a somber ichneumon fly went hesitatingly by on powerful bronze-black wings, halting to explore some bit of ground or likely plant, in its search for prey.

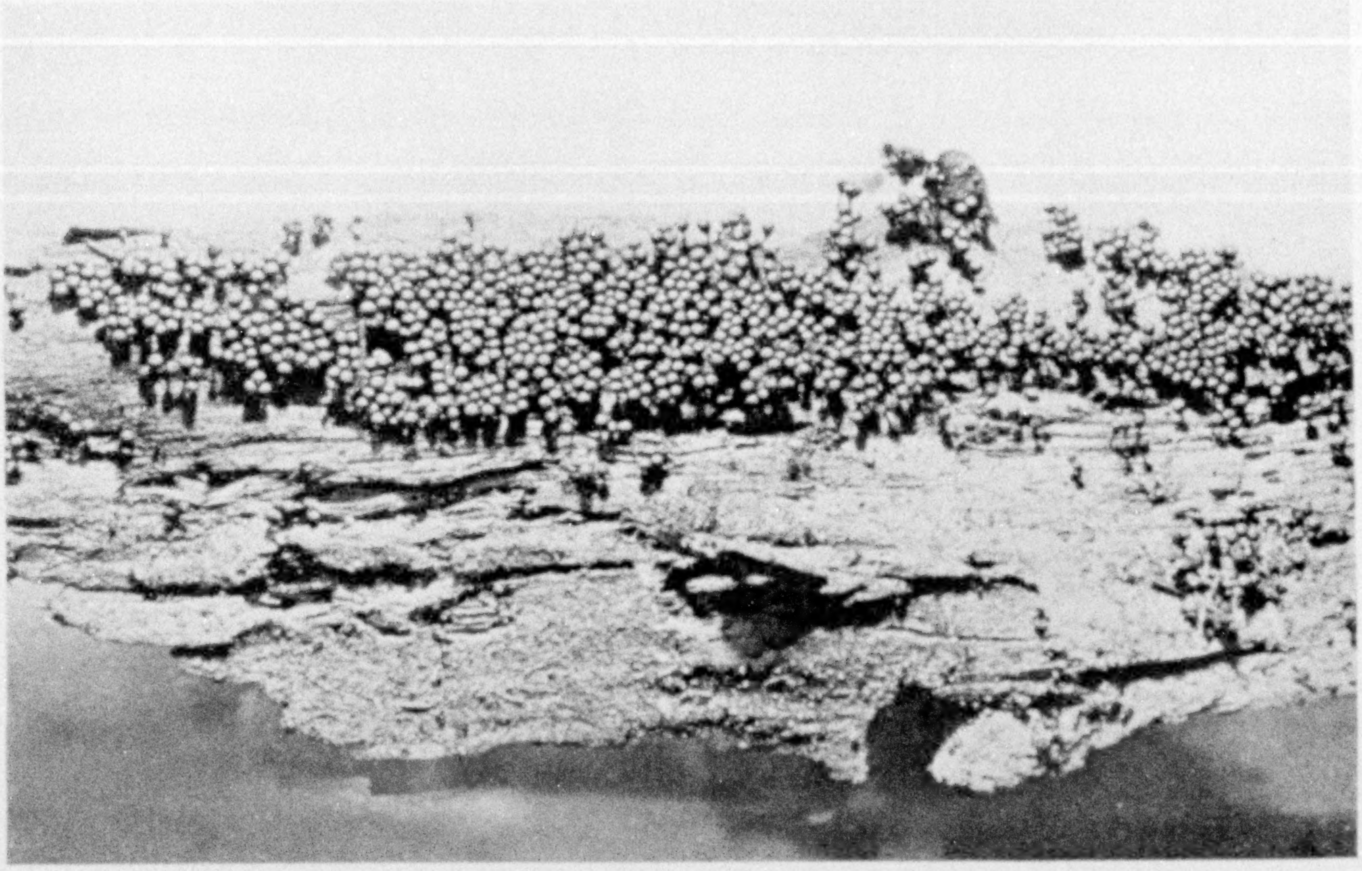
Now my nostrils were assailed by the heavy odor of a near-by stinkhorn toadstool, which loosed its strangling stench on the humid air.

### THE CLIMAX OF THE TRANSFORMATION SPECTACLE

Despite these distracting factors, I continued to watch the growing columns of the slime molds. The nascent sporangia were now becoming diffused with a deeper tone of pink, particularly at their bases. For the first time, I noticed that the cylinders were no longer in actual contact with the wood; a hairbreadth space had intervened, and they were slowly being elevated into the air, as the stalks began to form.

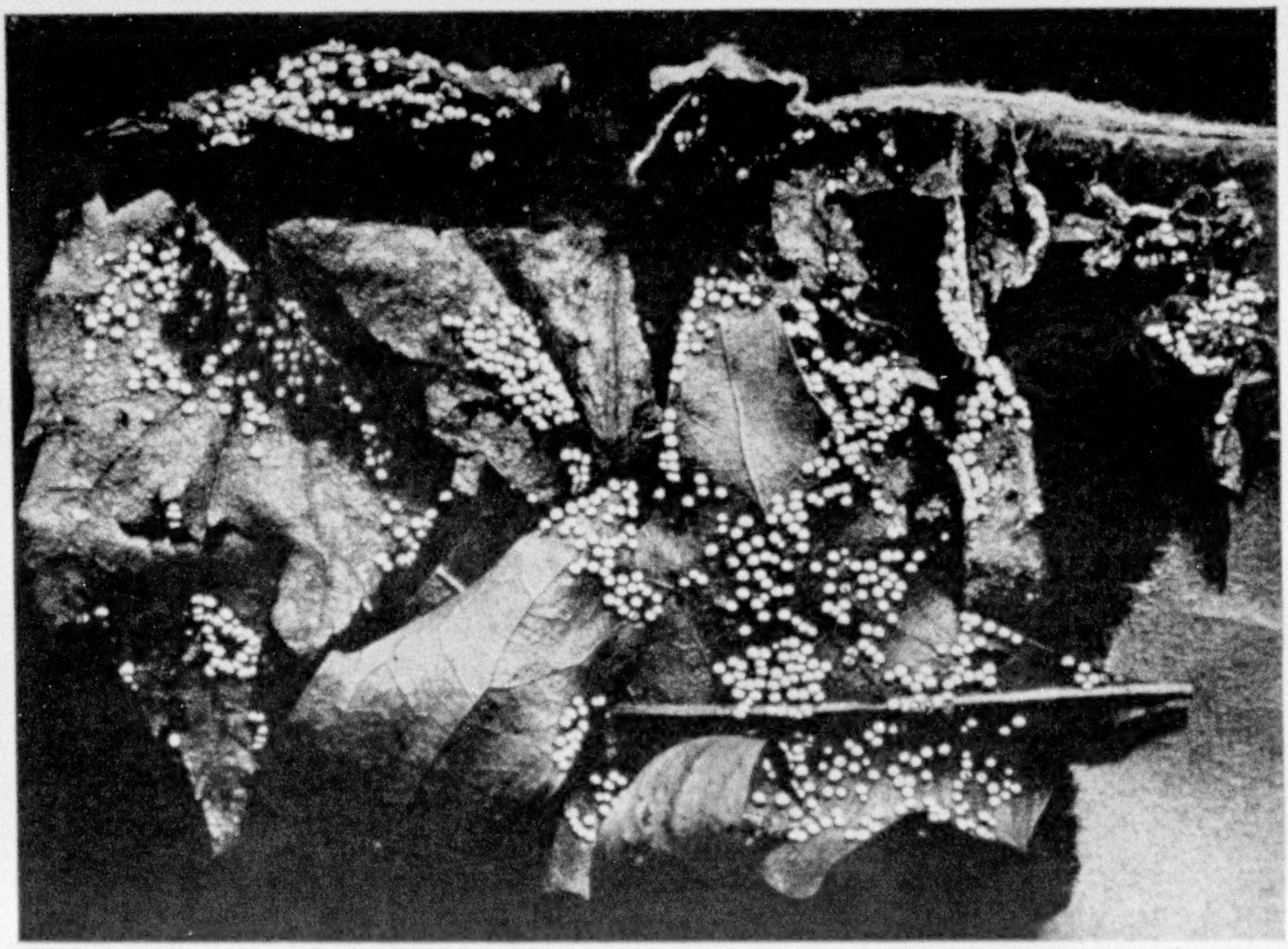
These threadlike stalks, which were of a deep tone of garnet red, gradually reached a length of one-half the entire organism and expanded like cups at the top.

The flaccid group had by now lost its compressed, or honeycomb, appearance; each individual unit stood staunchly upright, independent, seemingly apart from its neighbors, yet in crowded contact with them. The surface now began to dry, and



TRICHIA DECIPIENS (ACTUAL SIZE) IS AN INHABITANT OF WET LOGS

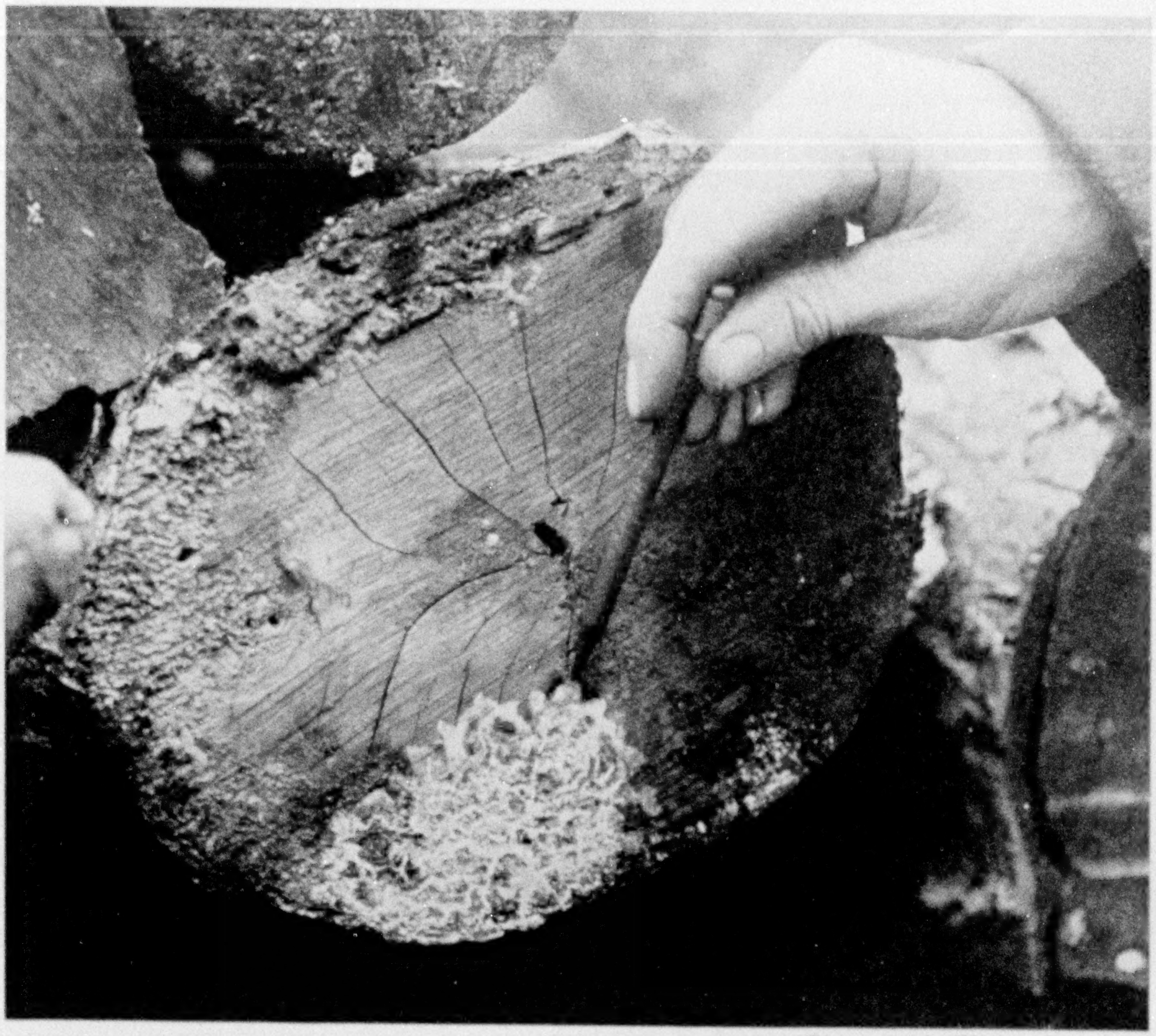
Colonies of this species of slime mold often cover areas of a square yard or more.



Photographs by William Crowder

DIDERMA TESTACEUM, SLIGHTLY ENLARGED

Compare with Color Plate XII of the same species.



Photograph by William Crowder

A SLIME MOLD TRAVELING

In this stage the plasmodium moves slowly about in search of food and moisture. Later it will develop into a beautiful object, similar to one of those shown in the Color Plates.

simultaneously the iridescent covering of filmy skin began to peel into shreds and tatters.

On the wings of the imperceptible movement of heavy swamp atmosphere, these fragments vanished, and—presto! there was revealed that wonder of wonders, a gauzy tangle of spore-laden threads called the capillitium.

The sporangia were now fully formed. There was no further increase in the length or breadth of any part. The plasmodial slime was completely exhausted. The microcosmic spectacle was at an end!

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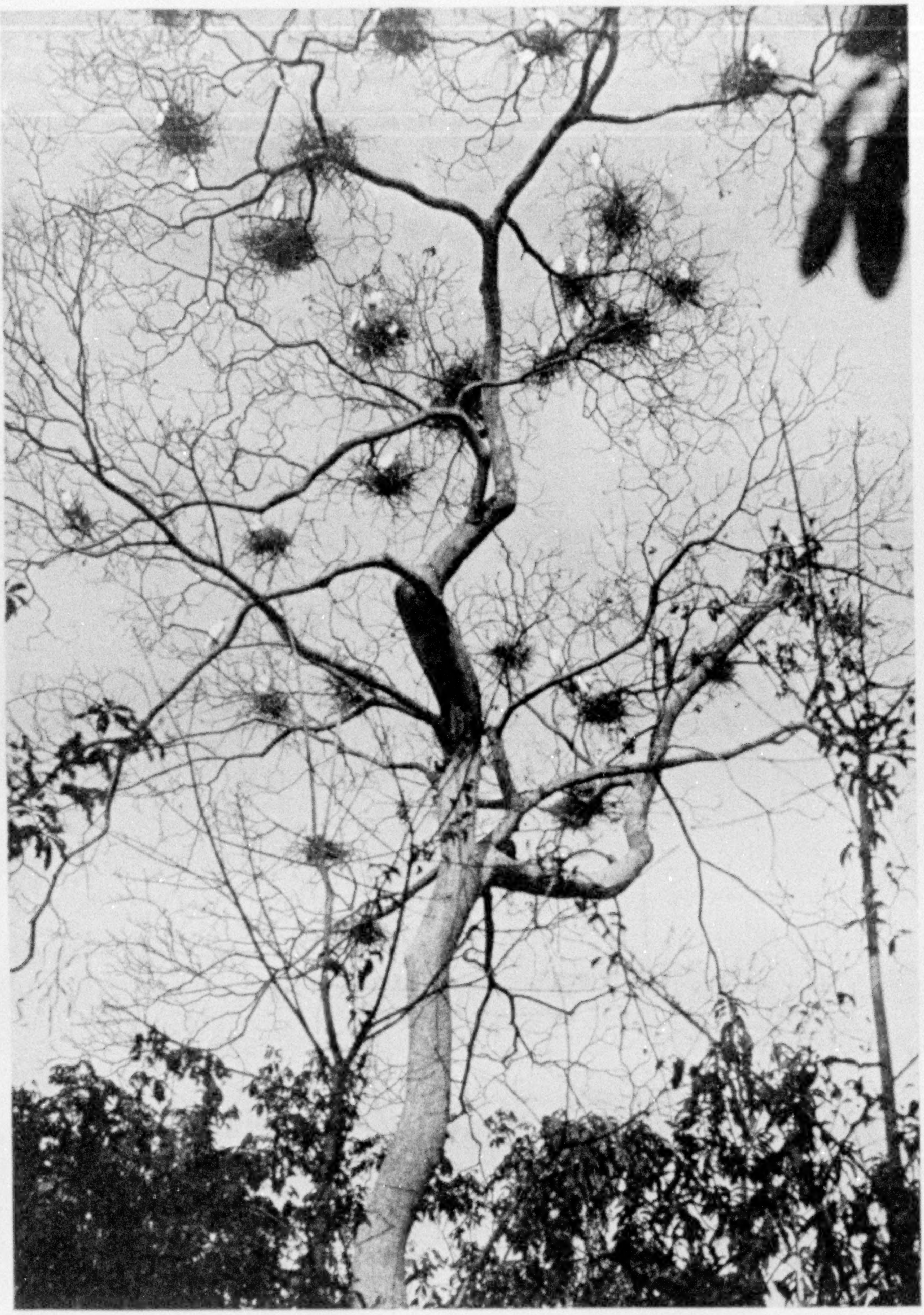


Photograph from Dr. W. L. Schurz

EGRET PLUMES IN THEIR PROPER PLACE: AMAZON VALLEY

The exquisite egret (the snowy, or little, heron) has suffered so much persecution at the hands of plume hunters that it has been appropriately called the bird of tragedy. In former years great flocks of these snowy creatures covered the banks of Amazonian lakes like a sheet of dazzling white. The plumes are most beautiful in July.

# THE AMAZON, FATHER OF WATERS

## The Earth's Mightiest River Drains a Basin of More Than 2,700,000 Square Miles, from Which Came Originally the World's Finest Rubber

By W. L. Schurz, Ph. D.

Commercial Attaché, American Embassy, Rio de Janeiro

RECENTLY there returned to Pará a party of six Americans who had completed the most comprehensive survey of the Amazon Valley ever made by any expedition. For nearly ten months these representatives of the United States Department of Commerce, sent out to investigate the crude-rubber industry in its original home, had traveled more than 20,000 miles on 37 rivers of the Amazon fluvial system.

We had carried the American flag up the Amazon itself, through the Pongo de Manseriche, the western gateway of the great plain, where the river cuts its way athwart the last chain of the Andes, more than 2,500 miles from its mouth and less than 250 miles from the Pacific.

To the north we ascended the Rio Branco to the open *campos* country that reaches away to the borders of the Guianas, and to the south, in the Madeira basin, we reached Sena, three days up the Madre de Dios above Riberalta, Bolivia.

### THREE GOVERNMENTS COÖPERATED

The Brazilian Government supplied a fine steamer, the *Andirá*, for the use of the commission during its stay in Brazil, and in Bolivia and Peru similar facilities and courtesies were extended by their respective governments. In Brazil we were accompanied by a special Brazilian Commission of four members, who had had much experience in the far interior: Dr. Avelino de Oliveira, geologist; Dr. J. G. Kuhlmann, botanist; Dr. Fernando Soledade, of the Federal Public Health Service, and Colonel Raymundo Monteiro, the leading Brazilian authority on rubber.

On rivers where these steamers could not navigate we traveled in launches, barges, or dugout canoes. We covered more than 400 miles on horse- and muleback and one long stretch on foot.

The mightiest of the world's rivers owes its name to a fanciful yarn told by Francisco de Orellana, the first white man who ever descended the turbid waters of the Rio Mar, as later generations of Brazilians have dubbed the stream that is more than a river.

### A FANCIFUL YARN GAVE NAME TO WORLD'S MIGHTIEST RIVER

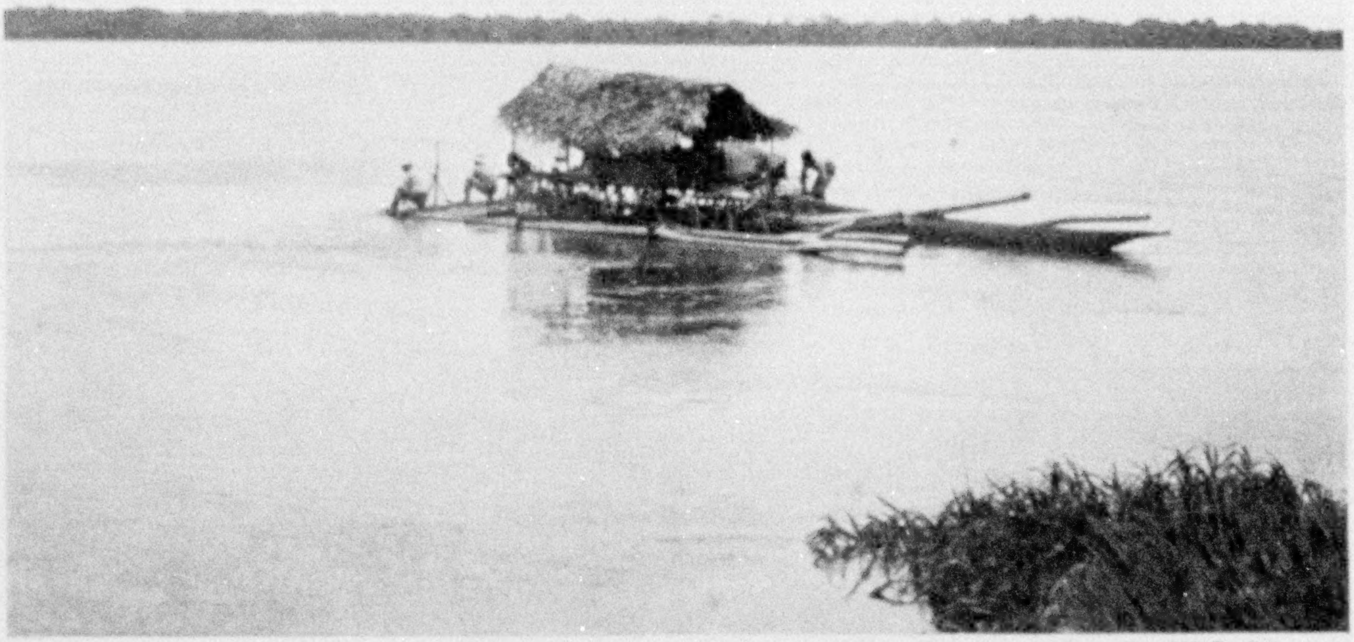
In 1541 Orellana was sent down the Napo by Gonzalo Pizarro in search of provisions for the forlorn expedition that had come over the mountains from Quito in search of El Dorado. Finding it easier to continue downstream than to return, and probably driven on by curiosity and avarice, he took to the "flowing road" that months later carried him out onto the Atlantic.

Among the adventures which Orellana related to his credulous contemporaries in Spain was one of an encounter with female warriors near the mouth of the river that is now called the Trombetas, or River of Trumpets. It was these long-haired savages—whether women or more probably men—who were responsible for the naming of what the Indians themselves, in the *lingua geral* of Brazil, called the *Paranáguassú*, or "The Great River."

Ever since the memorable voyage of Orellana the process of exploring and opening up the vast wilderness world of the Amazon basin has been going on, and much yet remains to be done.

Some years after the Pizarros had been wiped out in the civil wars of Peru, the terrible Lope de Aguirre led out of the Amazon and around up the Venezuelan coast the remnants of an expedition whose leadership he had assumed by the assassination of two successive chiefs of the party.

Adventurers in search of treasure cities in the jungle or devoted Catholic missionaries carried on the work from the Spanish side of the Andes.



Photograph from Dr. W. L. Schurz

NAVIGATING THE AMAZON ABOVE IQUITOS

Rafts are a much more common sight on Peruvian tributaries of the Amazon than in Brazil or Bolivia, the Peruvians being especially skilled in their construction. Frequently the rafts carry a thatched hut, in which the family lives during the slow journey downstream (see text, page 453). The source of the mighty river is only about 112 miles from Lima, Peru.

From the east Pedro de Teixeira led an expedition upriver that did much to secure Portugal's possession of the greater part of the valley, and intrepid "bandeirantes" from far-off São Paulo pushed northwest in long treks across Matto Grosso and into the basin of the Madeira.

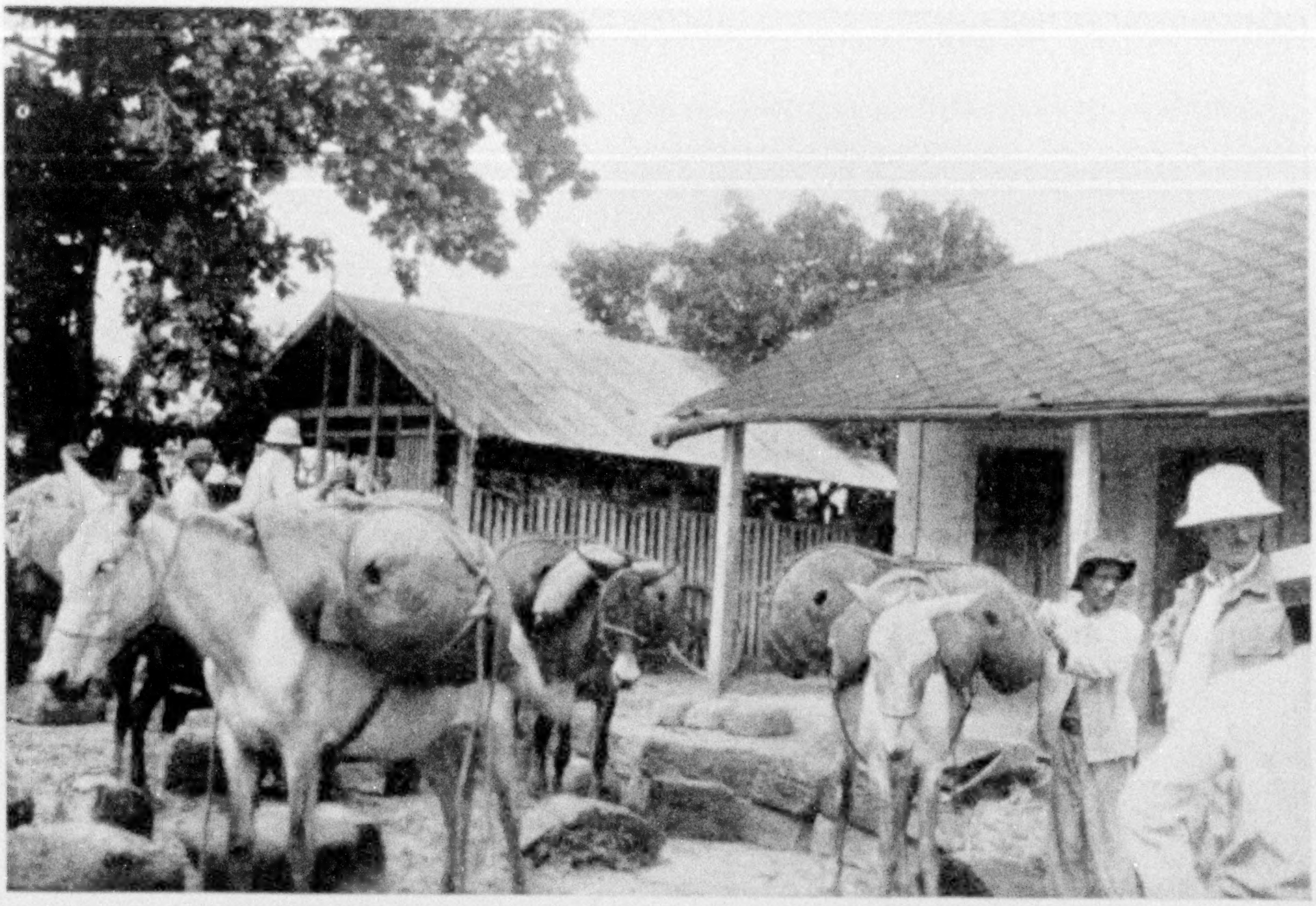
### TWO AMERICAN NAVAL OFFICERS WROTE A CLASSIC REPORT ON THE RIVER

The nineteenth century brought a more intelligent and scientific study of the Amazonia. The epic days of the Conquest were past, and, though the same hardy qualities were needed in the new race of explorers, theirs was a different task than that which the early Spaniards and Portuguese had faced.

Among the new generation were the great German, Humboldt; the Frenchman, Castelnau; the Englishmen, Bates and Wallace; Agassiz, the botanist, and the Americans, Orton and Heath. Two other Americans, Lieutenants Herndon and Gibbon, of the United States Navy, crossed the Andes from the Pacific in the fifties and descended the Amazon, the one directly from Peru and the other from La Paz, by way of the Beni and the Madeira. Their report to Congress is one of the classic works on the Amazon country.

A still later group of specialists working over the Amazon basin includes the American ornithologist, Leo Miller; the Oliveiras, Brazilian geologists; Hartt, the American, also a geologist; Huber and Ducke, the Swiss botanists; Barboza Rodrigues, the Brazilian author of a monumental work on the palm tree; engineers like Colonel Church, of Madeira-Mamoré fame (see text, page 451); the brilliant Brazilian Euclydes da Cunha; the Bolivian, Rivera, and the Frenchman, Paul Le Cointe, the foremost living authority on the Amazonia.

Among the explorers were two remarkable women—Mme. Coudreau, who spent years in exploring the rivers of the State of Pará, after her husband had died in the work for which he had been engaged by the government of that State, and Dr. Emilia Snethlage, a Swiss scientist, who



Photograph from Dr. W. L. Schurz

TRANSPORTING "BLACK GOLD"

The blocks of rubber are known as caucho, product of *Castilla elastica,* and the balls are of *Hevea brasiliensis* (see text, page 462). The discovery of rubber dates from the second voyage of Columbus, when the great navigator found the natives of Haiti playing with balls of an elastic substance.

crossed overland from the Xingú to the Tapajóz through a wilderness unknown even to the rubber workers of that region.

In the vast field of Matto Grosso, General Candido Rondón and his corps of aides have spent a generation in exploration and in the collection of scientific data, until to-day the immense territory that stretches from the Araguaya west across the upper reaches of the Xingú and the Tapajóz to the Madeira and the Guaporé is known to Brazilians as Rondonia. Americans will recall that it was Rondón, then colonel, who was joint leader with Colonel Roosevelt of the famous expedition that in 1913-14 descended the "River of Doubt" (now the Roosevelt).

### RUBBER HUNTERS HAVE DONE THEIR SHARE OF EXPLORING

Much of the opening up of the Amazon Valley has been the work of the men who pushed farther and farther up the river and into the country in search for rubber. Some were like the Suarez brothers, who built up a veritable empire in Bolivia; others were obscure rubber workers, whose journeys and discoveries in the jungle have never been recorded.

Among the most extraordinary of these anonymous explorers have been the Peruvian *caucheros,* or hunters of the rubber-yielding *Castilla elastica,* who have wandered all over the Amazon Valley in search of new stands of the tree. These they ruthlessly destroy and then push on in their jungle Odyssey to more virgin territory.

These restless nomads may be found all the way from the forests of the Ucayali and Javary east to the Xingú and down into the Guaporé country between Brazil and Bolivia. They mingle with the Brazilian rubber workers in the rude camaraderie of the great solitudes, but have generally waged a truceless war with the Indians, whose tribal lands they invaded in their tireless quest.

### THE TRUE "FATHER OF WATERS"

Though not the longest of rivers, the Amazon is, by reason of its volume and

Photograph from Dr. W. L. Schurz

"SWARMS OF ALLIGATORS OFTEN SHOW THEIR UGLY SNOUTS ABOVE THE SURFACE OF THE WATER"

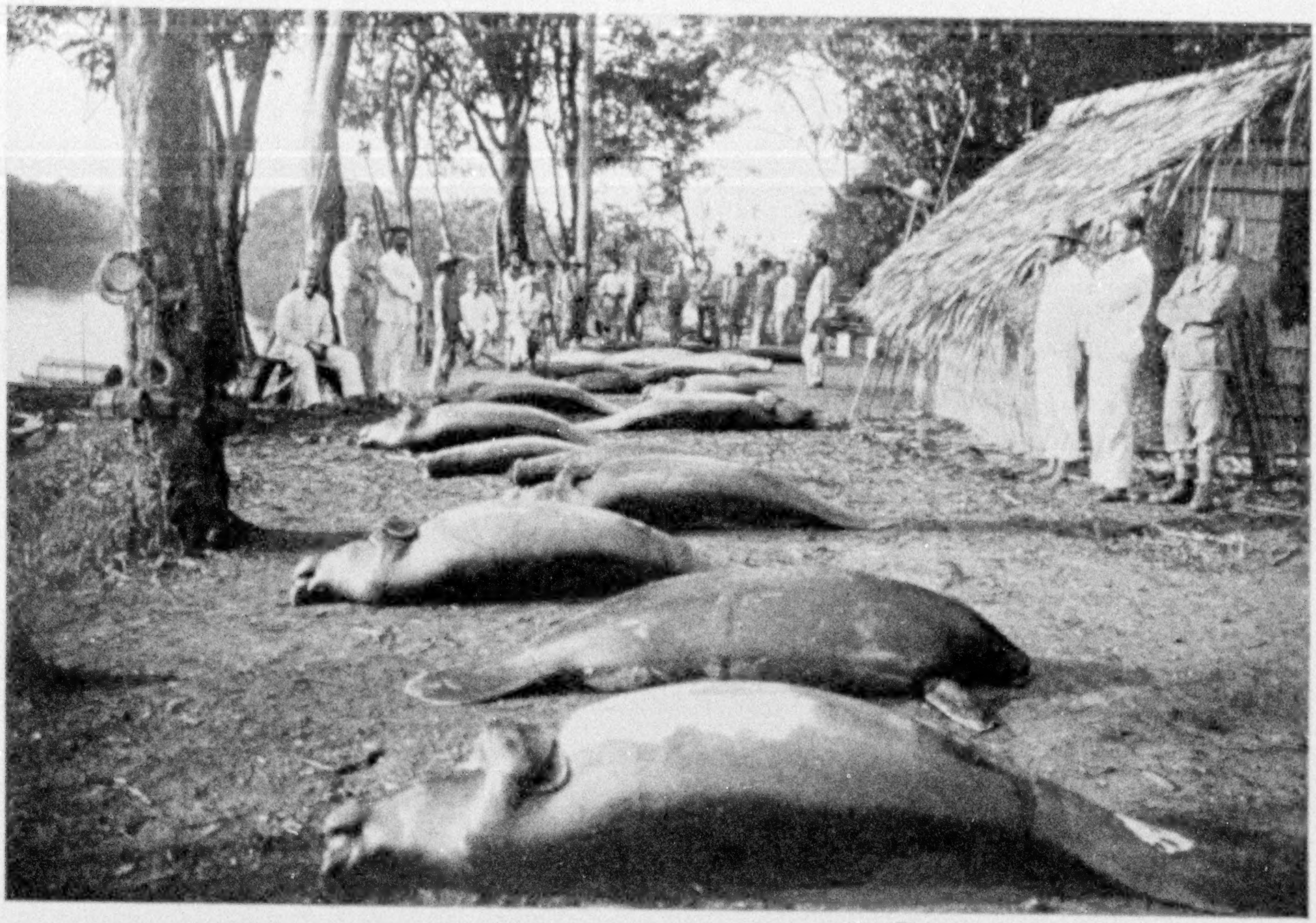
These reptiles are still numerous in Amazonia, despite the organized pursuit of hide hunters. At Manáos they are caught by floating within their reach a piece of hardwood, covered with raw meat, in which the alligator's teeth become imbedded when it snaps at the bait.

the magnitude of its fluvial system, the true "Father of Waters," the real "Rio Grande" of the world. It rises in a mountain lake high in the Peruvian Andes and flows north, through a deep gorge, for hundreds of miles. Then it turns east and heads through the last range of the Andes at the Pongo de Manseriche, to debouch therefrom directly onto the great Amazonian plain that reaches away across the continent to the Atlantic.

In the Pongo it is like a swirling millrace, some 50 yards wide; 2,000 miles below, the banks of its main channel are, in places, scarcely visible from each other.

For nearly all its length the Brazilian Amazon flows through a number of channels that are connected by cross canals, or *furos*. Only at Obidos has it a single channel. At this point it is less than 2,000 yards wide and 350 feet deep, and in midstream runs with a current of six miles an hour.

No other stream has such great tributaries as has the Amazon. Some of them have vast fluvial systems of their own, like the Madeira, whose remotest headwaters are found in the far-away Bolivian department of Potosí; or the Negro, most mysterious of Amazonian rivers, which



Photograph from Dr. W. L. Schurz

THE MANATEE AND ITS COUSINS GAVE RISE TO THE MERMAID STORY

This mammal, allied to the dugong and known variously as cowfish, peixe-boi, and manatee, has such keen sight, smell, and hearing that the Amazon natives must use all their skill in taking it with the harpoon or in nets set across the entrance to its feeding grounds. Its bluish-gray color makes it difficult to distinguish from brackish water or floating logs. The flesh tastes like pork and the fat yields an oil used by the Indians for massage in certain diseases.

comes down out of the wild country of southeastern Colombia and is connected with the Orinoco system by the strange Cassiquiare Canal; or the Purús, with its long branches, such as the Ituxý and the Acre. These are also the widest of rivers, the Tapajóz being eight miles from shore to shore at Boim and the Negro ten miles in the Boiossú Channel.

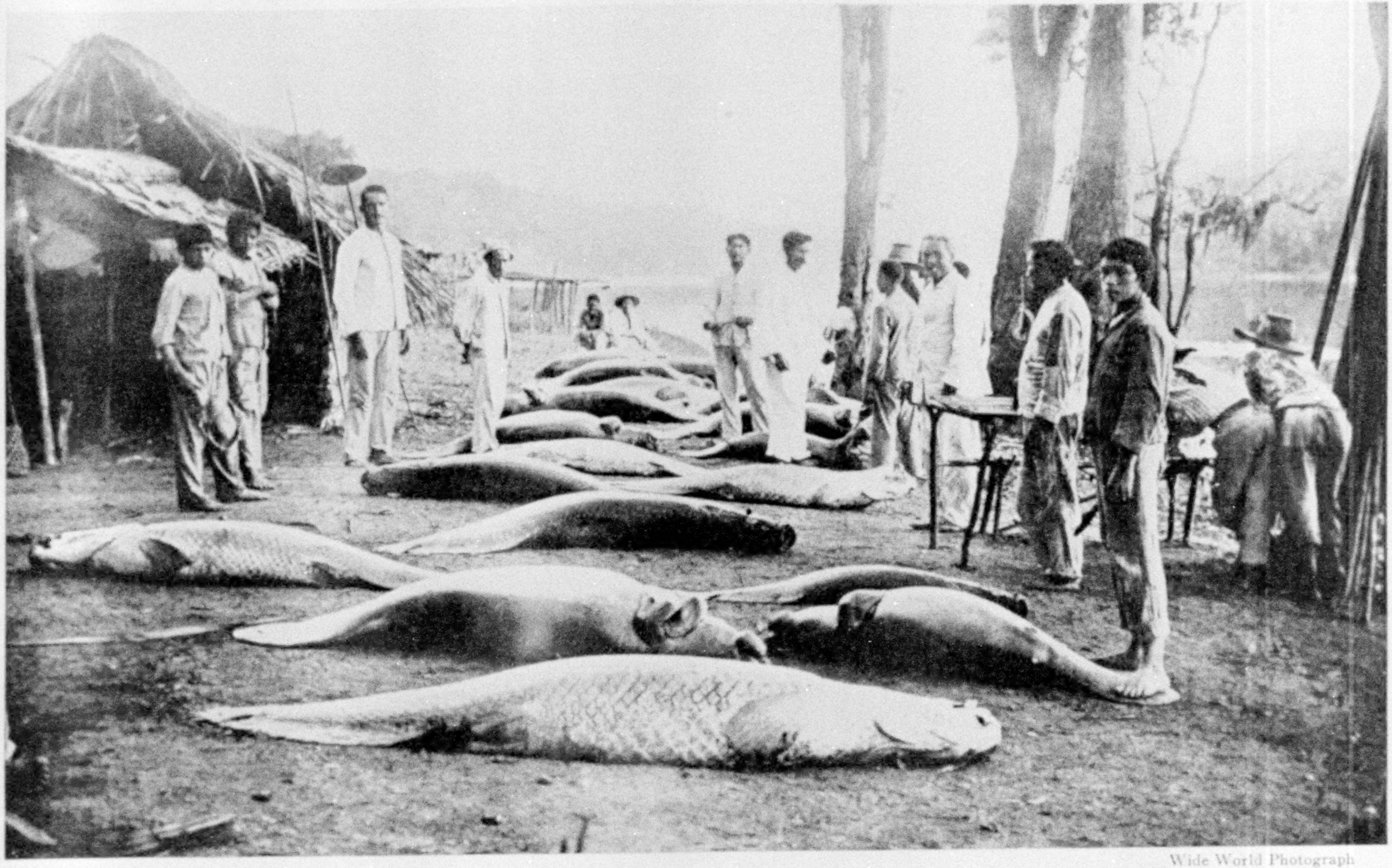
### AMAZING VARIETY IN AMAZON TRIBUTARIES

There is considerable variety among the rivers of the Amazon system. Some, like the Purús and the Juruá, meander across the alluvial plain in huge oxbows, across the neck of which the river may cut a new way in a single month of flood. Others flow in a fairly straight course, like the Branco.

Some are black-water rivers, like the swarthy Negro and the Jutahý; others are clear streams, like the fine Tapajóz, or the Branco, so named for its "white" water, or the Guaporé. Most of them are yellowish streams, carrying vast quantities of alluvial sediment. Such are the Purús, the Juruá, the Ucayali, and the Amazon itself, which is always muddy.

Where the black Negro and the white Tapajóz enter the tawny Amazon, a sharp line divides their waters for miles before they finally mingle; also, some of the rivers have wide flood plains, and sometimes a veritable labyrinth of channels intersects these low-lying areas, as in the country between the Japurá and the Solimões. Sometimes they flow between high banks, as does the Tapajóz for most of its course, or as do the Jurity and the Parauarý.

Most of the Amazonian rivers bear the names given to them by the Indian aborigines. Some are majestic-sounding, as befits the great streams so named, like the Xingú and the Purús and the Juruá; some are melodious names, like Araguaya, Aripuaná, Tahuamanu, Inambary, and



Wide World Photograph

A REAL FISH STORY FROM THE PURÚS RIVER

This is a day's catch of pirarucú, the largest of fresh-water fishes. It sometimes attains a length of more than six feet and a weight of 200 pounds (see, also, page 452). The two specimens with flippers are not fish, but manatees, fresh-water mammals (see, also, illustration, page 449).

Juruena; some are strange-sounding Indian names, Tupi, or Quichua, Gy-paraná (pronounced Zhee-paranáh), or Jacundá, or Buyuyumanu, "manu" being the Peruvian Indian word for river; some might have been left by an Arabian conqueror, as the names of the Bolivian rivers Beni, Madidi, and Abuná; still others bear the names of foreign explorers, like the Heath, Orton, Chandless, and Roosevelt.

Comparatively few have Portuguese or Spanish names, among the exceptions being the Amazonas or Amazon itself, the Madeira, the São Manoel, the Trombetas, the Negro, and the Madre de Dios, known to the Bolivian Indians as Manutata, or "Mother of Rivers."

### FAMOUS MADEIRA-MAMORÉ RAPIDS HAVE COST MANY LIVES

Nearly all the rivers of the Amazon system are broken by rapids or waterfalls at a certain stage in their course.

The most famous, though not the highest, of these rapids are those which break the course of the Madeira and the Mamoré for more than 200 miles.

It is around these rapids that the famous Madeira-Mamoré Railroad was built to serve as an outlet for the rubber and other products of northeastern Bolivia. Previous to its construction rubber was brought down from Bolivia in large *batelones* (canoes). These shot the less dangerous rapids and were dragged painfully and slowly around the more perilous ones. The return trip was a matter of months and the losses of men from malaria, Indians, and capsizing in the rapids were enormous.

The first promoter of a scheme for a railway to circumvent the rapids was Col. George E. Church, an American army engineer, who obtained a concession to build a line in 1870. However, it was not until 1878 that a firm of Philadelphia contractors began work on the Madeira. The American and other workers suffered such frightful mortality from fevers that the undertaking had to be discontinued the year of its initiation.

### RAILROAD BUILT WITH AID OF TONS OF QUININE

The final impulse for the completion of the work came with the Treaty of Petropolis, in 1903, whereby Brazil bound herself to construct the line as compensation to Bolivia for the latter's cession of the Acre country.

The contract for construction was given to a syndicate represented by Mr. Percival Farquhar, and American engineers resumed operations in 1907. The road was completed to the Abuná in 1911 and opened to traffic in 1913 as far as Guajaramirim, the present terminus of its 226 miles of line.

The principal problem in its construction was that of sanitation. Men died by the thousands of malaria, beriberi, yellow fever and other fevers; 400 out of 600 German laborers died, and Spaniards, Greeks, Barbadians, and other elements that were brought in suffered as heavily.

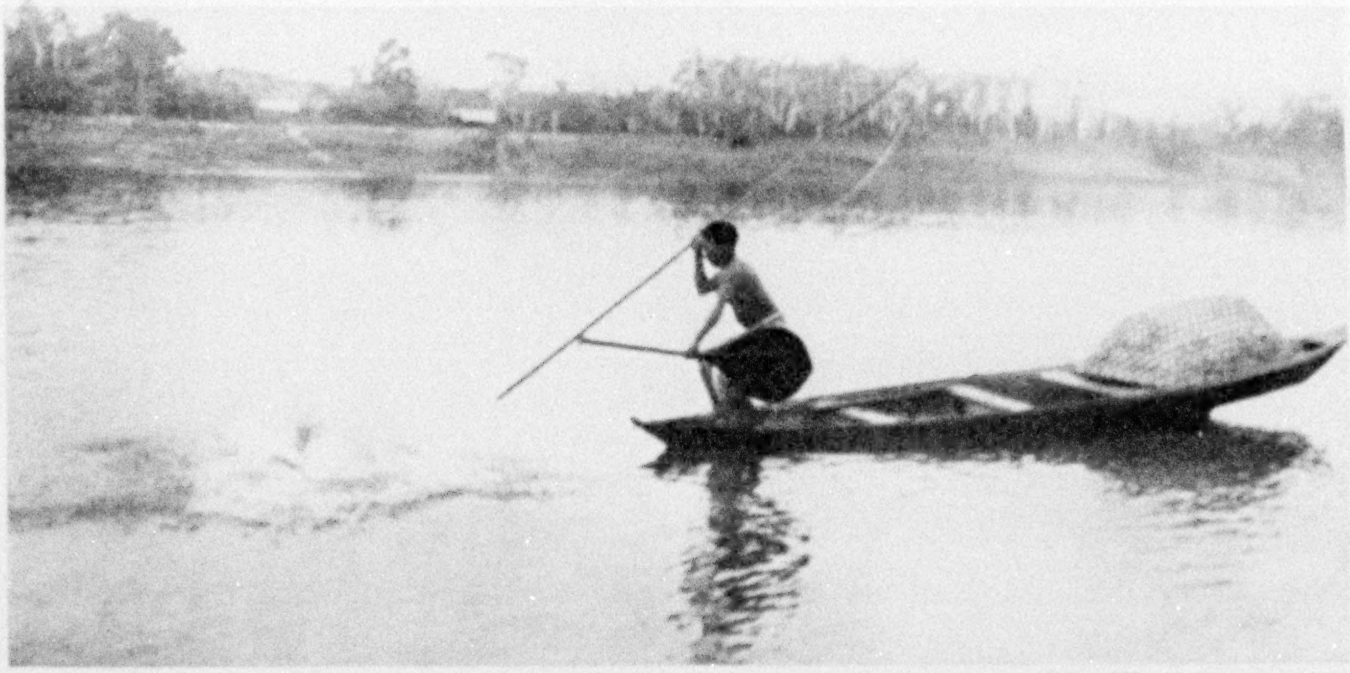
When the line reached the fatal camp of the Jacý-Paraná it seemed for a time as if the whole enterprise would have to be abandoned, as it had been in 1878. However, heroic measures saved the great job from failure. Quinine was brought in at the rate of over two tons a year and served with the meals in all the camps. Buildings were screened, as at Panama, and in addition to the main hospital at Candelaria efficient camp hospitals and hospital trains were put into service.

### ONE OF THE COSTLIEST ROADS EVER BUILT

Doctors made the daily rounds of the construction gangs in track automobiles, treating all who were ill and tagging the more serious cases for transfer to Candelaria. During the four years 1908-11 the total entries at Candelaria totaled 30,430 patients.

There have been few conquests of American sanitary and civil engineering to compare with the completion of this railroad, isolated in the heart of the South American Continent. It was finished too late to be more than a financial liability, for the great rubber boom had collapsed and traffic from the Beni country declined in volume and value with the falling price of rubber. More than $30,000,000 had been expended on the line, one of the most costly railroads ever built.

A small band of British represents the company that administers the road for the Brazilian Government. Theirs is a discouraging task, but done efficiently. One



Wide World Photograph

SPEARING THE FISH MONARCH OF AMAZON WATERS

The skillful native harpoons the pirarucú from the prow of his boat when an agitation of the water denotes that the fish is approaching the surface. During high water it is also caught by a line attached to a tree on the bank or to a perch in the middle of lake or river.

train a week makes the run through the jungle between Porto Velho and Guajaramirim, stopping overnight at the village of Abuná, where the traveler finds the best hotel between Pará and the Andes.

Guajaramirim is a small frontier town, whence one jumps off into the wilderness of the Guaporé or takes the little sternwheeler that goes south toward the heart of the Bolivian Oriente.

Here we saw blocks of caucho rubber from the Guaporé, and a carload of lean dogs for the lonely workers in the *seringaes*, and wild-eyed cattle from the Mojos plains of the Mamoré, with horns so wide they had, according to one native, to be loaded sideways into the cars.

At Porto Velho the Candelaria Hospital still stands as a haven for the sick and injured for hundreds of miles up and down the railroad and the rivers. The clean, well screened buildings lie among pleasant grounds overlooking the Madeira, and around them are flower and vegetable gardens.

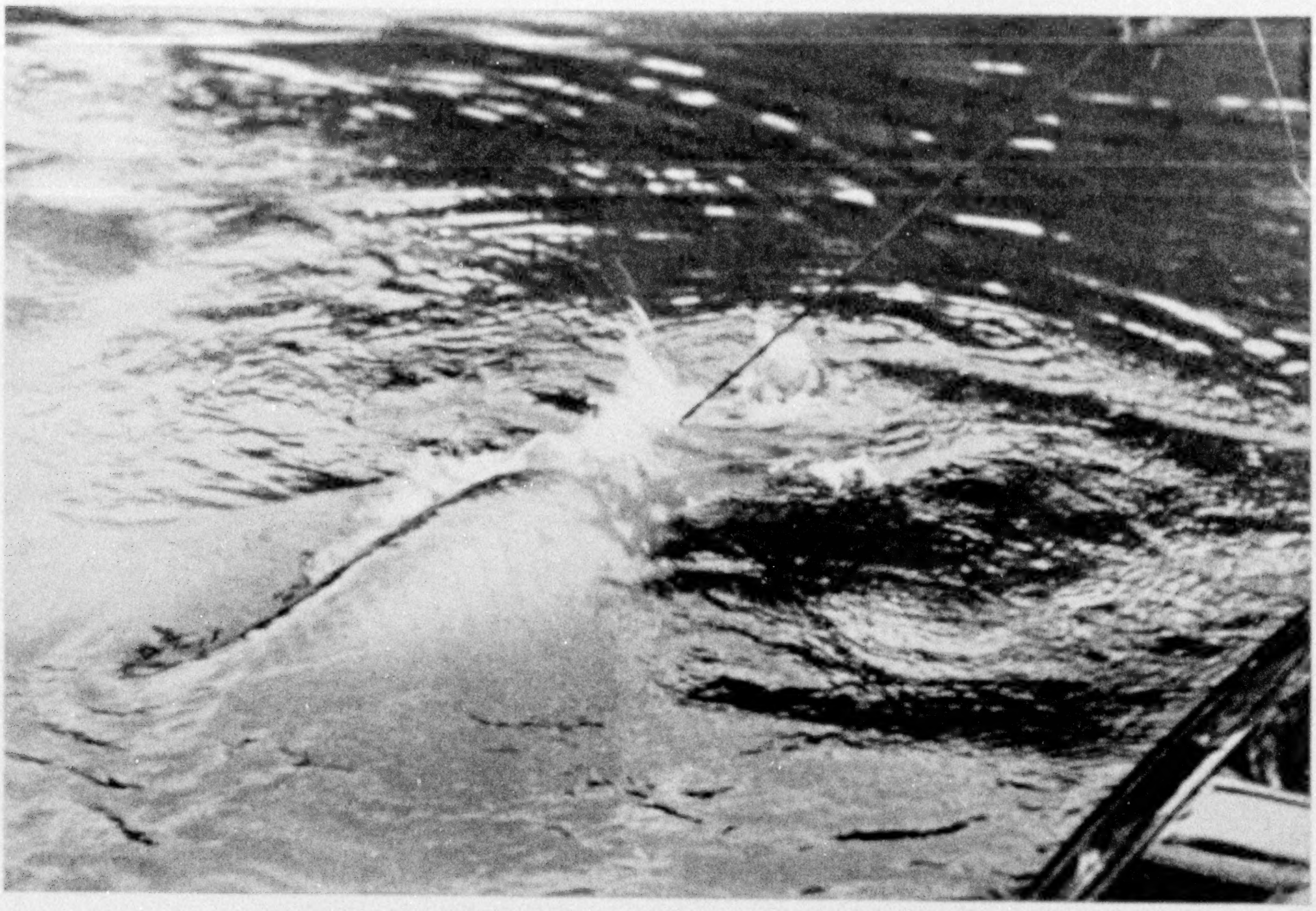
In all that vast basin of the Madeira no one is so esteemed as Dr. William Emrich, the veteran American physician of construction days, who is in charge of the Candelaria Hospital.

### LARGE FLEETS OF STEAMERS, CANOES, AND RAFTS PLY AMAZON RIVERS

A large fleet of steamers plies up and down all the large affluents of the Amazon. It is possible to travel with comfort from Pará as far as Yurimaguas, on the Huallaga, in Peru, hundreds of miles above Iquitos, and up all the great tributaries to the limit of navigation, fixed by rapids or bars (see map, page 354).

During the rainy season, when the rivers rise from 30 to 50 feet, it is possible to go much higher, unless there is a permanent barrier, as at Santo Antonio, on the Madeira. Ocean-going steamers from Europe and the United States regularly ascend the Amazon to Manáos (see page 355), nearly 900 miles from Pará, and the same vessels could go up to Iquitos, more than 2,000 miles from the mouth.

Above Iquitos there are 500 miles of navigation for steamers drawing nine feet of water—that is, to within a few miles of the Andes. A line of steamers is actually in operation between Iquitos and Cal-



Wide World Photograph

THE END OF THE GIANT'S STRUGGLE (SEE, ALSO, PAGE 450)

Exhausted, the speared pirarucú (see opposite page) allows itself to be pulled alongside the canoe to meet death from a machete. Its cured and salted flesh forms a staple food for the river dwellers, its dried tongue makes an excellent file, and its broad red-margined scales are used as sandpaper for polishing native weapons and gourds.

lao, the port of Lima, on the Pacific, by way of the Panama Canal, making a journey of more than 6,500 statute miles by water to connect two points, only 630 air-line miles apart overland!

The common type of steamer used on the Amazonian rivers is popularly called a *gaiola*, or bird cage, because of the open superstructure, adapted to the tropical climate. On the rivers of the Acre and on the Rió Negro shallow-draft stern-wheelers of our Mississippi River type are employed.

A wide variety of other craft is seen. The Peruvians are especially skilled in making canoes, some of their dugouts holding 15 or more persons. They are also famous builders of rafts, which are a much more common sight on the Peruvian rivers than in Brazil or Bolivia. Frequently these rafts carry a thatched hut, in which the family lives during the slow journey downriver, and they may also carry cattle and pigs and a flock of chickens (p. 446).

Two years ago a huge raft came down the Purús from Peru with 17 families aboard, housed in as many cabins, and with a large supply of live stock and poultry.

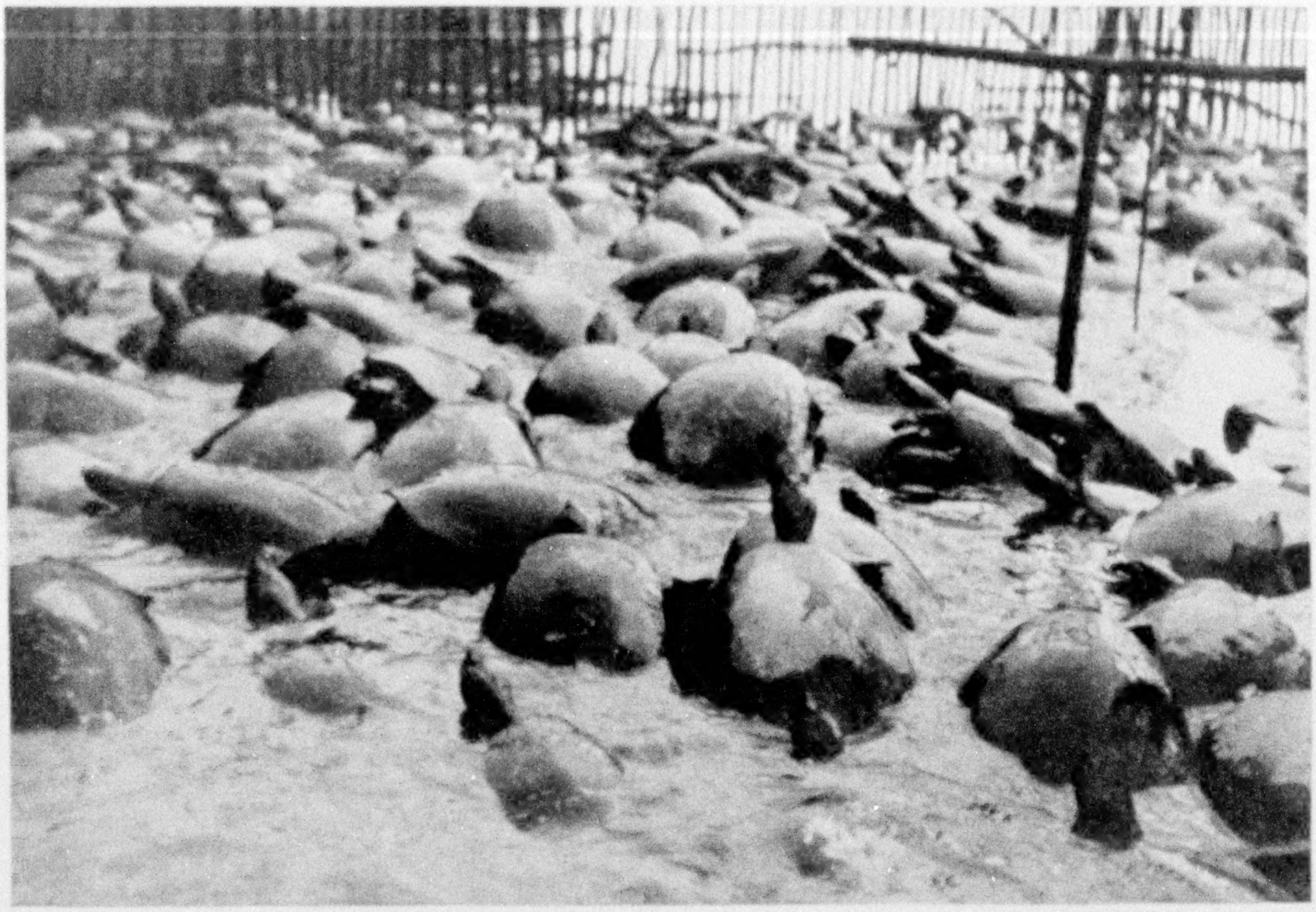
Rubber is also frequently transported by making a raft of the balls, on which a low platform is built for those who pole it downstream.

### THE AMAZON BASIN IS MORE UPLAND THAN MORASS

In spite of the cataclysmic floods that annually sweep over the valley, to pour out through the wide mouths on both sides of Marajó, the Amazon Valley is not a gigantic morass, where man must be half-amphibious to survive. Probably not more than 5 per cent of the more than 2,700,000 square miles of the Amazonia are below the normal flood level of the rivers. The great mass is upland country.

One who travels on any of the rivers is surprised by the high bluffs that border them for long distances.

Isolated hills and mountains are also prominent phases of the Amazonian landscape. A day above Pará one sights to



Photograph from Dr. W. L. Schurz

A SWARMING TURTLE PEN ON THE RIO BRANCO (SEE, ALSO, PAGES 362 AND 383)

Despite the wholesale destruction of their eggs, turtles still abound on some of the rivers in Amazonia, and "their pursuit constitutes one of the most important industries in certain districts" (see text, page 460). After being shot in the neck with an arrow to which a cord is attached, they are herded into pens to await shipment to Manáos or Pará. From the flesh is prepared a number of tasty dishes; the eggs furnish turtle oil and turtle butter.

the north a broken chain of mountains that continues a long way to the west. At Monte Alegre it crops out at the river's edge in a remarkable hill, from which one may see the Amazon Valley in epitome.

To the south, beyond a maze of connecting *paranás* that run among lush meadows, where cattle graze for most of the year, rolls the wide yellow flood of the Amazon's main channel. To the north of this hill there stretches a country of open grass lands against a background of mountains that shut off the horizon. On the lowlands to the east and west is the tropical jungle.

Far away to the northwest, in the campos, or open country of the Rio Branco, mountains loom up in every direction, to culminate on the Guiana border, in the Mountains of the Moon on the east and high Roraima on the north.

After weeks or months on the monotonous jungle-lined rivers, we always greeted these campos lands with a feeling of release from some oppressive confinement. We breathed deeply and our spirits rose as if we had come out into a freer and fresher world. In fact, we have no more pleasant memories of the Amazonia than of galloping across the open country of the Rio Branco and of the lower Amazon, with the cool wind blowing in our faces and mountains looming up on the horizon.

### THE AMAZON JUNGLE OFTEN CAUSES PANIC

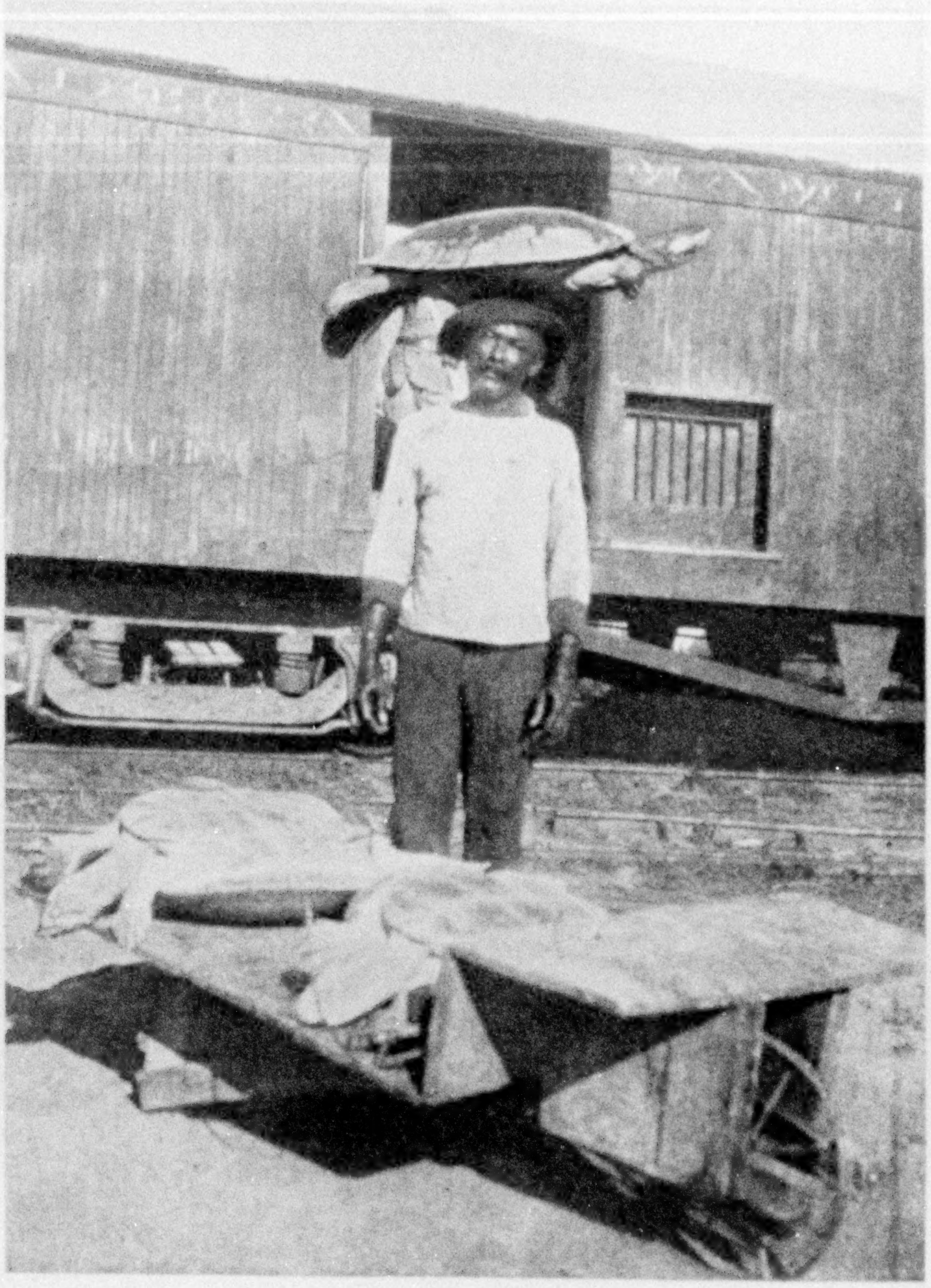
The Amazonian forest is not the tangled and impenetrable jungle that is usually imagined. The heavy growth of vines and trees that generally lines the banks of the rivers is probably responsible for this impression, but back of this matted curtain of vegetation the forest soon becomes fairly open, and one can usually walk through it without even the need of a machete to cut a way.

Progress is difficult only when the jungle falls into low ground, where bamboo or *tobocal* forms a thorny maze, or when there is a heavy growth of palm trees.

The flooded forests are always forbidding and sinister, as the upland forest never is. Yet it is easy for the unpracticed woodsman to become lost in either, once he strays far from the trails. He is then liable to be seized with a panicky apprehension, especially as the jungle is poor in food, except for the good marksman who is well supplied with ammunition.

Edible plants are scarce, and during the dry season the only source of water for a long distance may be in the *cipós*, or huge boalike lianas that hang from the trees. Even then one must have a machete to cut the thick vine.

We heard many tales of denizens of the valley who had been lost in the inhospitable bush and had been saved by wandering rubber workers when on the point of starvation or exhaustion.



Photograph from Dr. W. L. Schurz

LOADING TURTLES AT PORTO VELHO

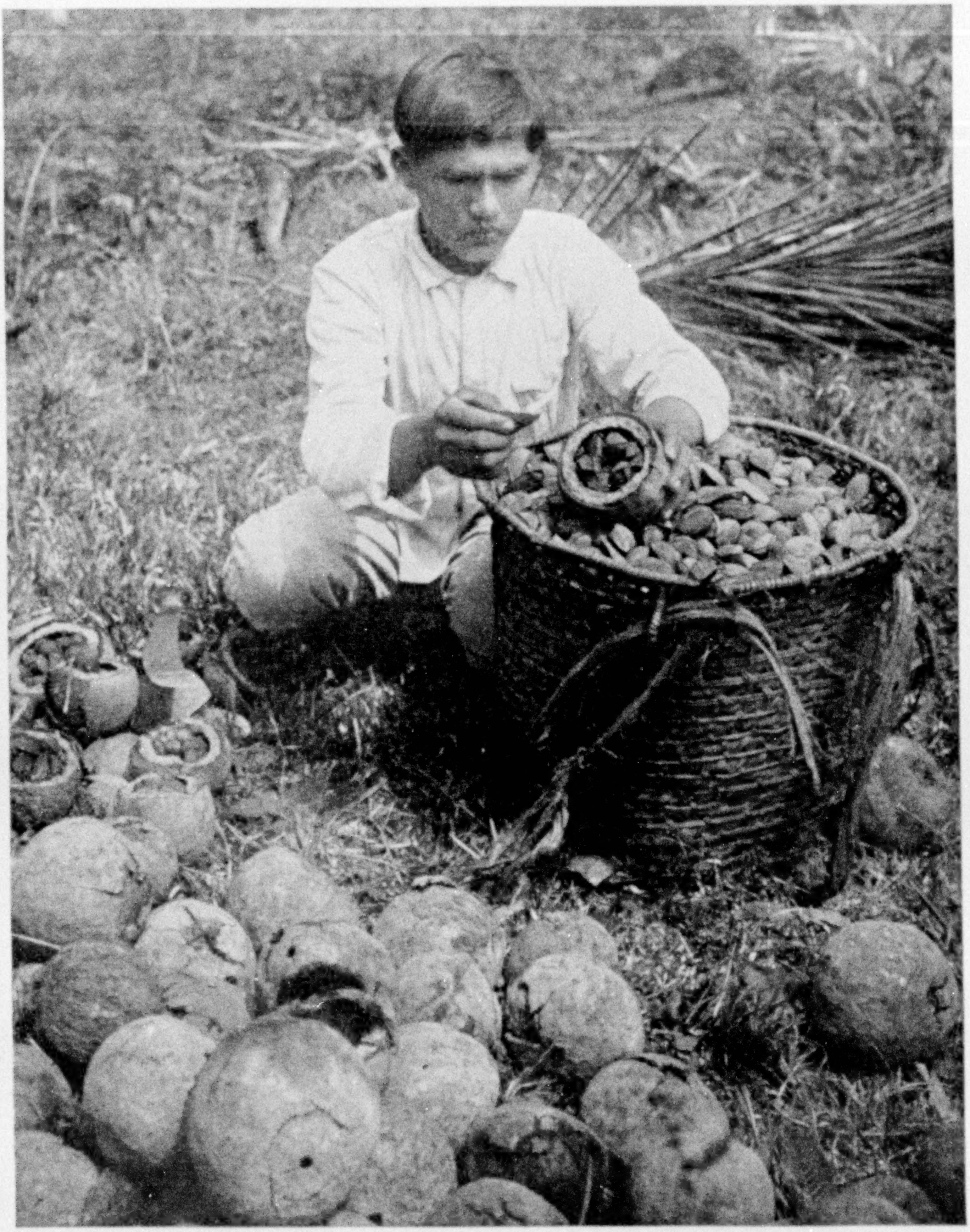
The head of steam navigation on the Madeira is also a terminus and administration headquarters for the Madeira-Mamoré Railroad, probably the most remarkable forest railway in the world (see text, page 451). Almost every sleeper along its 226 miles represents a human life. Porto Velho itself is a clean European village, well planned and lighted.

### ONE AMAZON PLANT YIELDS HIGHLY INFLAMMABLE SAP

The outstanding tree of the upland jungle is the *castanheira*, or Brazil-nut tree, which towers high above the general level of the forest. Sometimes these giants are found with a circumference of nearly forty feet.

Scattered through this jungle are hundreds of species of trees that range in hardness from the light balsa wood to the heavy, deep-red aitá, one of the hardest of all woods. Among them are such curious trees as the assacú, feared by the natives for the powerful astringent poison in its sap.

The Amazonian flora contains many remarkable poisons, some of whose virtues are known only to the Indians. Among these toxins are the terrible *mata calado*, or "silent death," which is reputed to leave no trace in the system; the *capanço*, about whose powers fantastic tales are told in the Acre country, and the famous



Photograph from Dr. W. L. Schurz

EXTRACTING BRAZIL NUTS FROM THE PODS

The pod sometimes weighs more than two pounds and contains from 12 to 22 nuts. After these are extracted with a machete, they are washed and sorted for shipment, the United States taking the bulk of the crop (see text, page 455).

*curare,* a poison brew used for tipping arrows.

Among other interesting plants are the one known to the Peruvians as *chuchuasco,* whose sap is generally reputed among the natives to have the properties of "the fountain of youth"; the *parauarý,* whose efficacy as a cure for wounds we demonstrated on several occasions; and a species of laurel, common on the Rio

Negro, which when bored into at a certain season of the year yields a considerable quantity of clear, inflammable liquid that should find a use in industry.

### THERMOMETER MAY VARY 54 DEGREES IN 15 HOURS

The climate of the Amazonia is not one of unmitigated heat, as is popularly believed. During the middle of the day it is generally very hot, and at such times the jungle is a veritable Turkish bath. However, the nights are nearly always cool enough to demand a blanket for comfort, and in the so-called winter season there is frequently a succession of cool days, when the mornings are uncomfortably chilly.

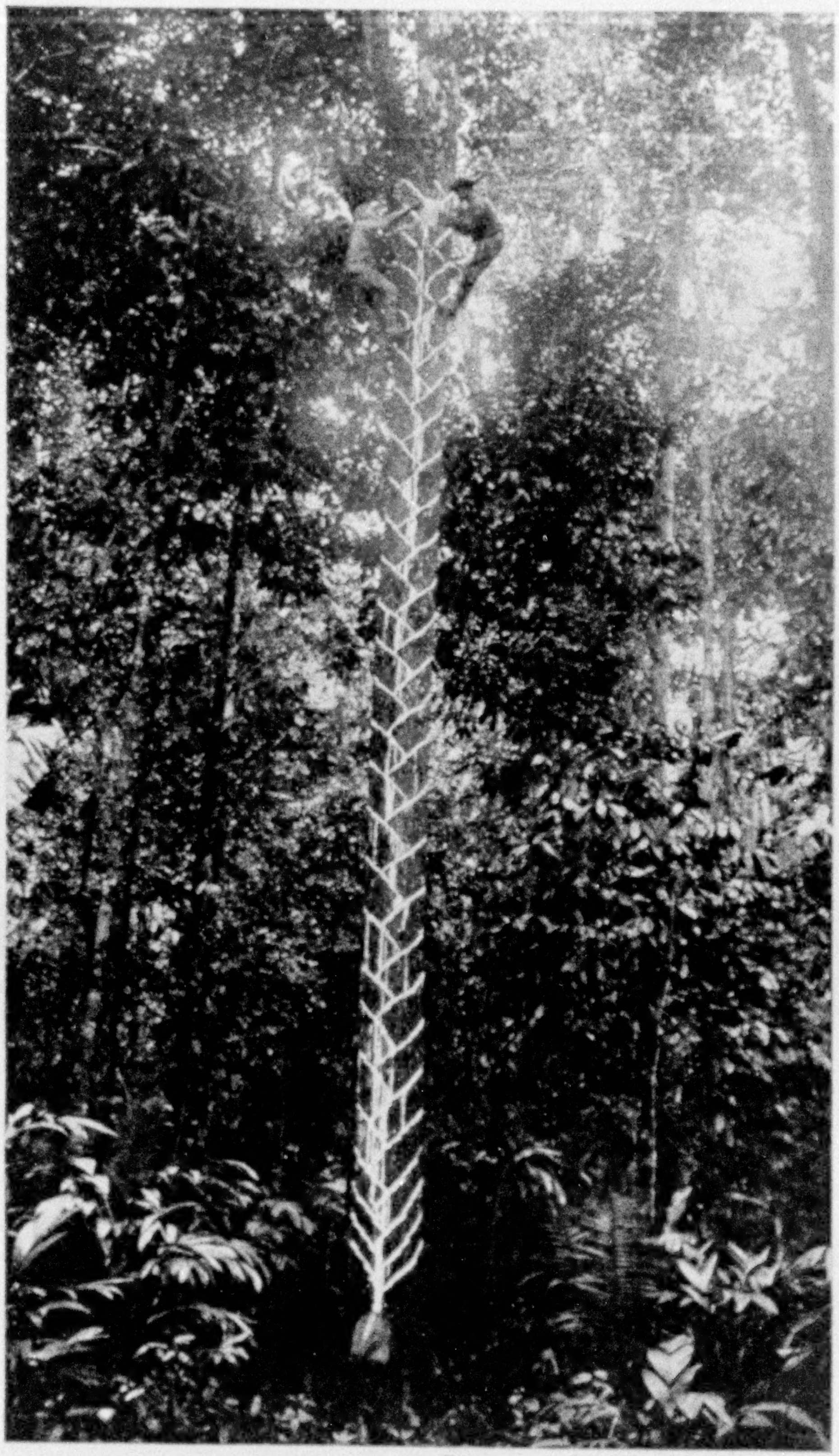
The daily range of temperature may be very wide, and I recall one day on the Madeira when a thermometer on the open foredeck of the *Andirá* registered 130° at 3 p. m., and at 6 the next morning read 76°.

A cool wind that blows from the snows of the far-away Andes brings the well-known *friagem*, that sends the thermometer down into the forties and sets the natives to shivering.

Nor does it rain incessantly, even during the rainy season, though the total rainfall averages about twice that of New York. There is, in fact, a real dry season, which is at its height in June and July, when rain may not fall for a month or more.

We found the long Bolivian ponchos, made of ordinary cotton cloth covered with a thin layer of fresh rubber latex, an excellent protection against the downpours, though very hot.

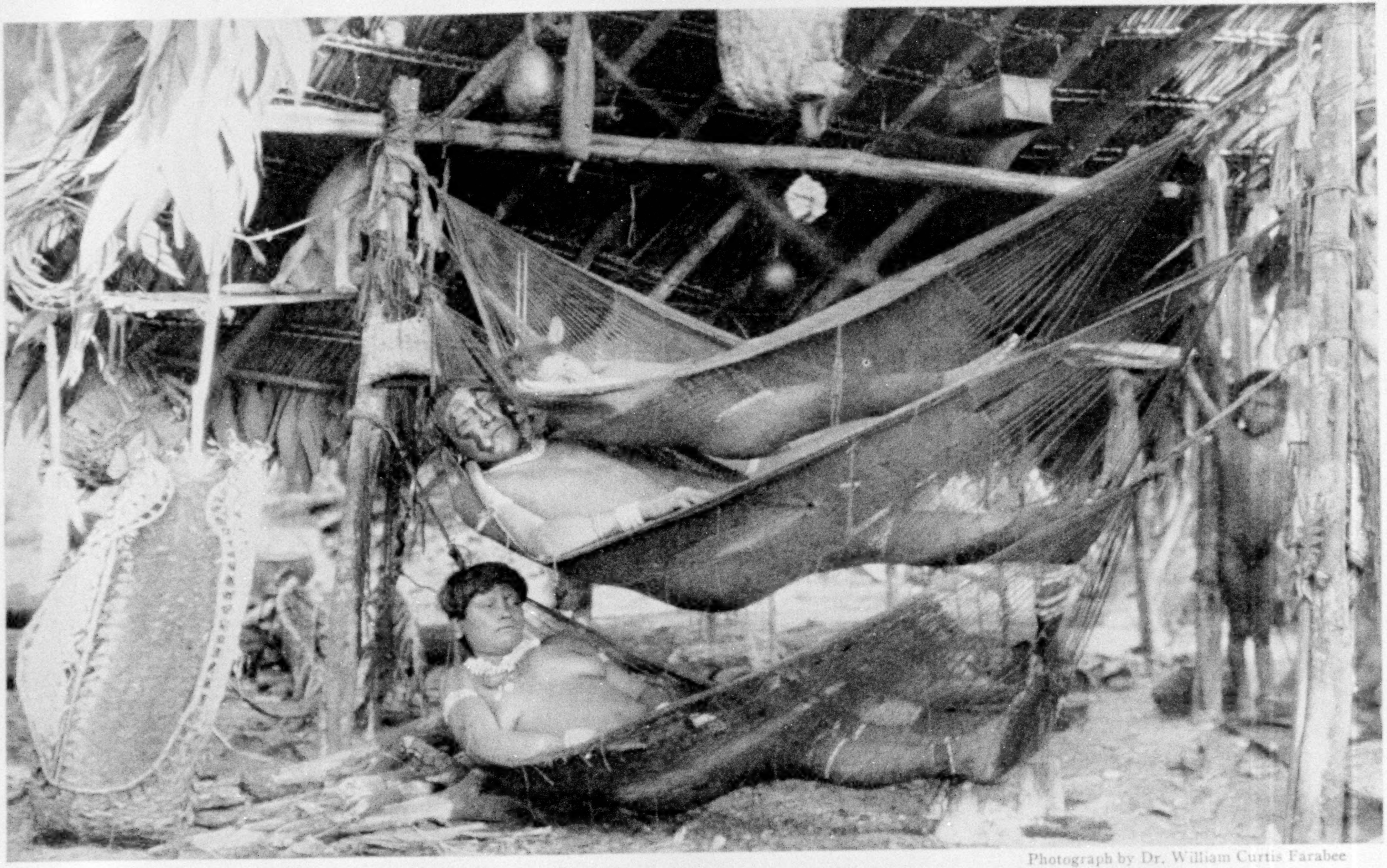
Except in certain ill-favored localities, where man's negligence or a highly unfavorable environment makes it so, it is



Photograph from Dr. W. L. Schurz

TAPPING A BALATA TREE FOR GUTTA-PERCHA

The stiff, heavy gum produced by the massaranduba, a slim forest giant known locally as the bully tree, is one reason for the existence of Boa Vista, the chief cattle-shipping point on the Rio Branco, tributary of the Negro (see, also, text, page 383). Gutta-percha has many uses in commerce, one of the most important being in the manufacture of balata belting.



Photograph by Dr. William Curtis Farabee

SLEEPING IN TIERS: AMAZON VALLEY

The hammocks of the whole family, among the Waiwai Indians living along the headwaters of the Trombetas, are tied to the same two house posts, one above the other. The mother sleeps nearest the ground, with the father and children above. The dog is kept on a platform at the head of the hammocks, so that the jiggers may not get into his toes.

not an unhealthful climate. White men spend their lives there in excellent health, though one may pay dearly for disregard of certain elementary rules of hygiene. Hookworm is widespread among the great mass of barefooted natives, and malaria in more or less malignant form is rampant in some districts, but over wide areas does not exist at all.

The gospel of quinine and the mosquito net has been spread widely by the devoted agents of the Brazilian Public Health Service and by the Catholic missionaries, who act as their aides in much of the Upper Amazon country.

Yellow fever and beriberi, which once took a heavy toll, have disappeared, the latter with the healthier diet that has come with a greater dependence on a fresh supply of locally grown food.

Leprosy is too common, but the Brazilian state governments are making a strong effort to segregate and treat the unfortunates afflicted with it.

### A "SINGING DOG" BROUGHT TO WASHINGTON, D. C.

There is much less *wild life* in the Amazon forest than would be expected. Every rubber worker in Brazil carries a .44 Winchester carbine on the daily round of his trees and shoots any animal that he sees. Then, at night, he will set his gun as a trap, or "armadillo," behind some log on his customary trail, over which prowling animals may jump.

Consequently, as one Brazilian put it, the wild game has been "liquidated" over wide areas of the valley or driven into the more remote interiors, sometimes by the heavy floods or by hunger. Most of it is a timorous, shrinking fauna. Even the jaguar, the largest of the carnivora, is seldom aggressive, though a related black species has a bad reputation, and the other felines are dangerous only to the smaller creatures of the jungle.

There are still monkeys in profusion, and at dusk or dawn the forest often reverberates with the truly terrifying roar of the "guaribas," or howlers, or the early morning silence is broken by the staccato chatter of the noisy prego monkeys. Monkeys are a highly esteemed article of food among the Peruvian woodsmen and are everywhere hunted relentlessly in the vicinity of plantations because of their predatory habits.

Deer are very common in some parts, but the tapir (see page 392) and anteater are going the way of other large game.

One of the rarest of Amazonian animals is the wild dog. I brought back one of these strange canines that was found in the Beni Valley, in Bolivia, and presented it to the National Zoölogical Park at Washington. The dog is amphibious, enjoying nothing more than to stand on his head in a pail of water. Instead of a bark, he makes a noise midway between a squeal and a chirp, which fact earned him much publicity as the "singing dog."

### THE SAVAGE PIRANHA DEVOUR AN ALLIGATOR

The rivers and lakes teem with life, in fact, the Amazonia is a fisherman's paradise. I have never seen so many fish as at some places on the Solimões, notably at the site appropriately called Piracema, "pira" signifying "fish."

The giant pirarucú, dried and salted in sheets, is the most valuable fish of the Amazonian waters. The mammalian peixe-boi, or cowfish, the manatee or dugong of other countries, is also widely hunted (see pages 449 and 450).

The savage, though small, saw-toothed piranha swarms in some of the rivers, ready to prey on anything, from fish to man, that exposes the slightest abrasion on the surface of the body (see, also, page 412).

Paul Le Cointe, the eminent director of the Commercial Museum at Pará, told me of how he had once seen a school of piranha devour an alligator. The alligator was pounced on by a jaguar, which turned it over and began eating into the tenderer parts exposed beneath. The injured animal had then crawled back into the river, where the piranhas set on it and, entering the cavity made by the jaguar, soon finished the helpless brute.

Where these fish are present it is even dangerous to trail one's fingers in the water over the side of a boat, not to speak of bathing in the stream.

Fresh-water porpoises, or botos, are seen frolicking far up the great rivers, where their semihuman antics have given rise to a local legend to account for doubtful paternity among the caboclo mermaids of those shores (see text, page 461).

Swarms of alligators often show their ugly snouts above the surface of the water (see page 448) or bask on the muddy shores, though they never enter certain rivers. Turtles abound on some of the rivers, in spite of the wholesale destruction of their eggs, and their pursuit constitutes one of the most important industries in certain districts, as on the lower Rio Branco. The hunters shoot them in the neck with arrows, to which a large cord is attached. They are then herded in pens by the hundred, to be sent down to Manáos or Pará (see pages 382-383, 454-455).

Electric eels grow to a large size, one which I killed in Peru having measured seven feet in length and nearly six inches in thickness. These eels are capable of giving a severe electrical shock, and one of our party facetiously suggested their propagation as storage batteries.

The Amazonia jungle is rich in bird life, and many species are remarkable for the beauty of their plumage or their song.

Parrots and macaws, the polycolored araras of Brazil and huacamayos of Peru, are very common, and there are few more beautiful sights in the jungle than these birds in flight.

A disagreeable feature of the Amazonian towns is the presence of flocks of funereal buzzards, usually perched on the most conspicuous buildings in the place or strolling about the streets with impunity.

### A PLAGUE OF INSECT LIFE

The Amazon Valley, unfortunately, is as rich in insect life as it is poor in large fauna. These include mosquitoes of the culex, anopheles, and stegomyia varieties (see, also, text, pages 377 and 405).

Even more pestiferous than the mosquitoes in some parts of the valley are the ants. One who inadvertently brushes against a tree may suddenly find his whole body the field of operation of scores of the dreaded *formigas de fogo* (fire ants), that leave him spotted with burning welts. While riding along a jungle road or canoeing under overhanging trees, one may expose himself to the same vicious attacks. A canoe which is boarded by these insect buccaneers is a most uncomfortable craft.

The savage taxi, or *tangarana*, ants grow to be more than an inch long, and a pinch from their powerful mandibles is a painful experience (see, also, page 408). The sauba, or leaf-cutting ant, is the principal enemy of agriculture in the Amazon Valley and has been known to cause the abandonment of certain localities by their inhabitants.

Among other insect pests are the chiggerlike mucuim, the bloodsucking pium and its larger brother, the borrachudo, and the annoying motuca fly. Tarantulas scamper about old buildings, and I remember pulling a large one from my boot in Bolivia.

Yet all these insects are not found everywhere and one is frequently exempt from all forms of insect life. On the other side, there is a profusion of butterflies, and one of the pleasantest recollections of rides through the jungle is of great blue morphos butterflies zigzagging down the trail ahead of me, the sun occasionally flashing from their brilliant cerulean wings.

One of the most curious insects found by our party was a well-armored and paradoxical Peruvian creature called the Traffic Bug, which carried a red light in its head and a green light in its tail.

There are few more widespread misconceptions of the Amazon Valley than that it is the chosen haunt of serpents of all kinds. Thus, a common picture in the old school geographies showed a boa constrictor seizing a horse and rider at once, and popular fancy has perpetuated this belief in the ubiquitous and deadly Amazonian snake. During our entire stay I saw by actual count six snakes. One may easily find them in the canebrakes and swamps or in old, abandoned houses, but by avoiding these one may travel far without encountering a snake.

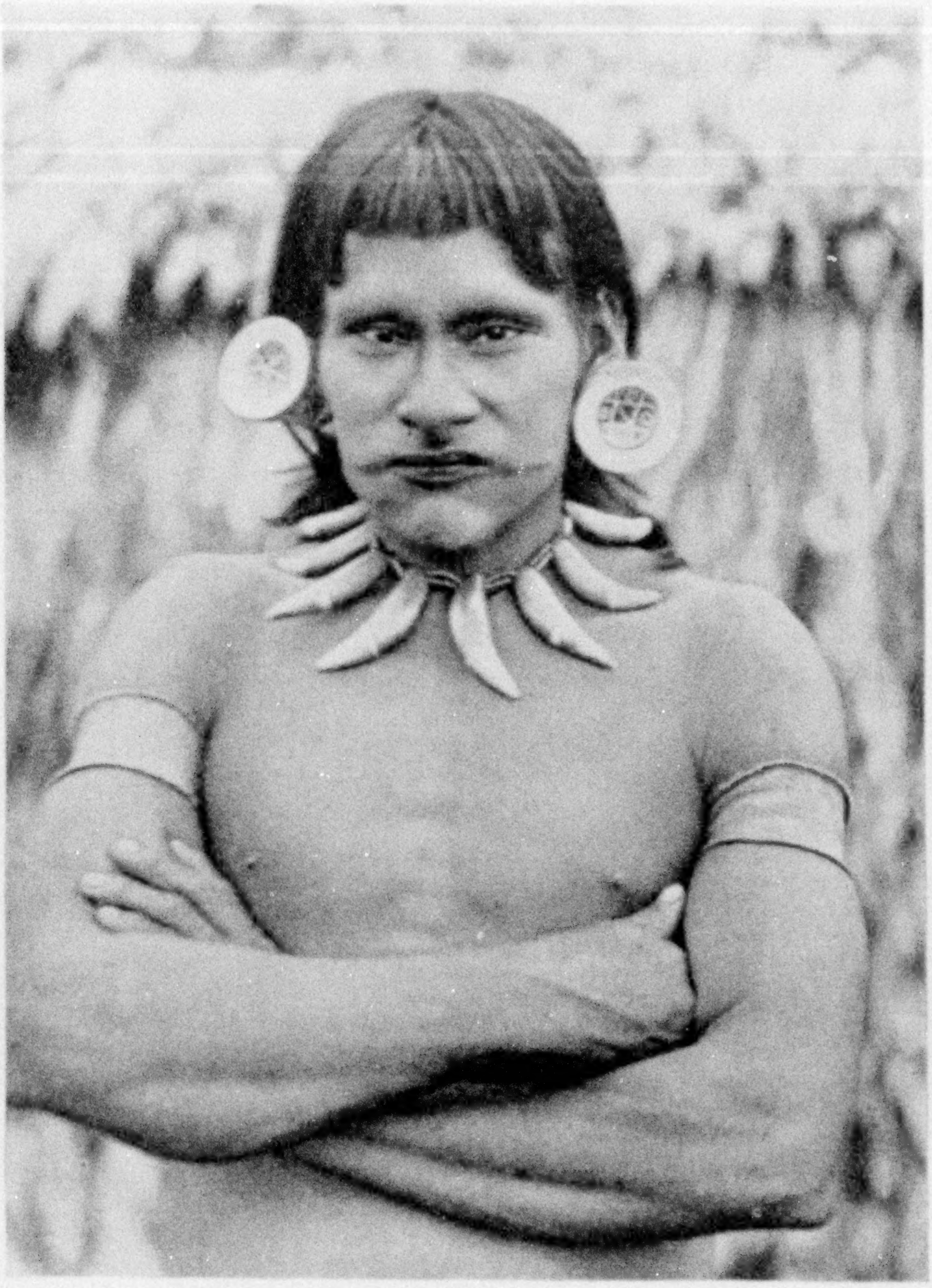
The best-known snakes of the valley are the jararaca and the surucucú, both of which are poisonous. The rather innocuous boa constrictor, or giboia, is encountered now and then, and, domesticated, is sometimes kept in houses for the purposes of ridding them of rats and bats. The much more objectionable anaconda, or sucurijú, grows to a great length and is the source of many myths among the natives, whose imagination enhances its size and prowess to terrifying proportions.

### MANY INDIAN TRIBES IN TROPICAL AMAZONIA

In all the tropical part of the Amazon basin there probably are between 1,500,000 and 1,600,000 inhabitants. Of these some 1,300,000 live in Brazil and the remainder in the five Spanish-speaking countries, but largely in Bolivia and Peru. The basic race is Indian.

There are still small groups of savage Indians in the jungle fastnesses on the Bolivian side of the Abuná, but they seldom appear along the river. Many tribes often reputed to be "bravos" or "barbaros" are innocent of any hostile intent so long as they are left alone by the whites.

The great mass of the population of the Amazonia is a mixed people, product in Brazil of the crossing of white with Indian and Negro, and in the Spanish countries of white with Indian. In Brazil these people are loosely referred to as *Caboclos* and in Bolivia and Peru as *Cholos*.



Photograph from Dr. W. L. Schurz

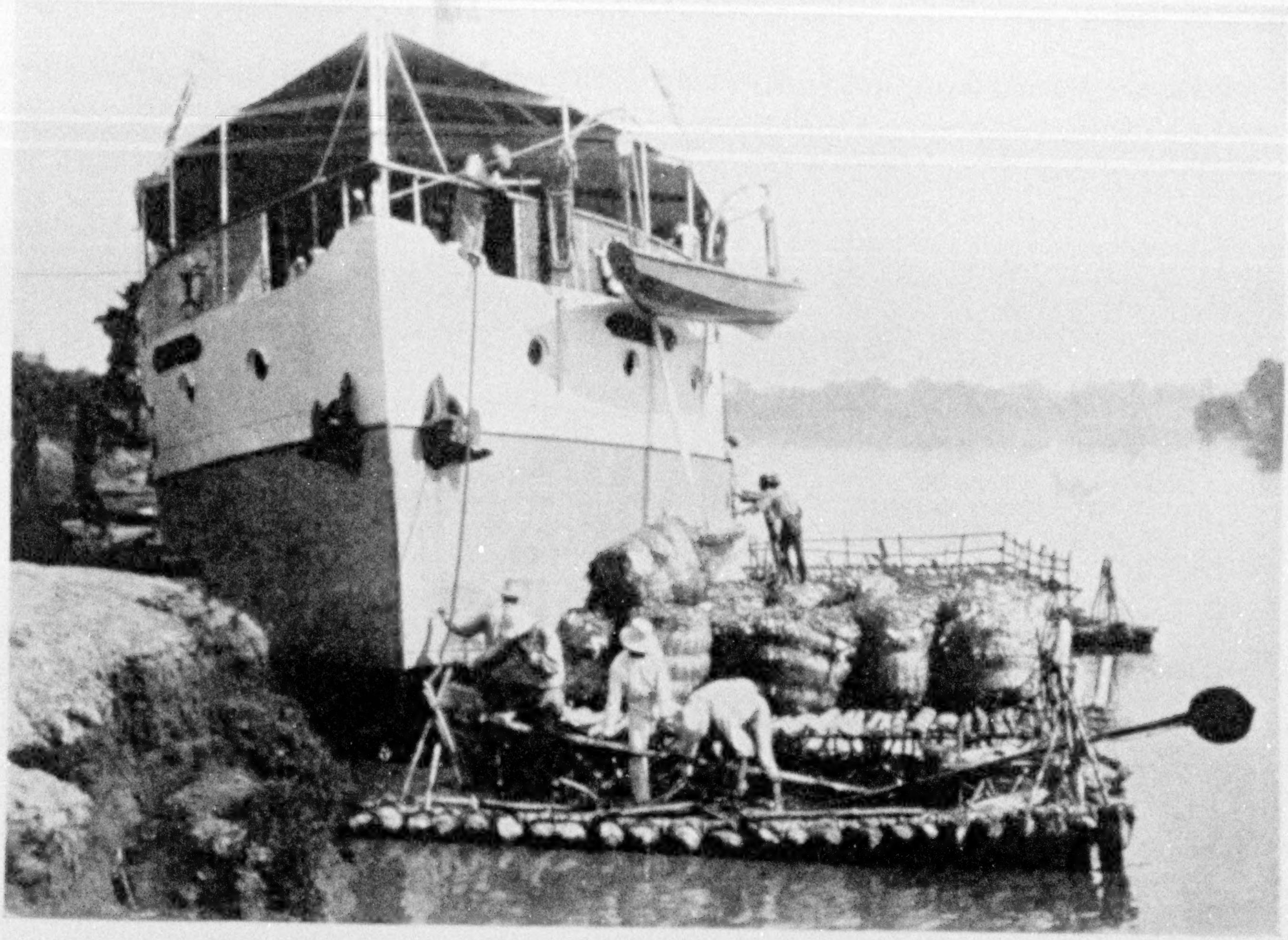
A HUITOTO INDIAN OF THE PUTUMAYO COUNTRY

Huitoto means "mosquito," and the tribe is so called because of the thin, misshapen limbs and fat bodies of its members. The practice of binding the upper arms, of wearing necklaces made from the teeth of jungle animals, and of adorning the ear lobes with short lengths of cane is common to several tribes of Amazonia. The Indians of this great rubber region were formerly exploited by unscrupulous agents, and consequently view every white man as a potential enemy.

### AMAZONIA, THE HOME OF THE RUBBER TREE

Above all else, the Amazon Valley suggests to the outside world RUBBER. For a long time it was the principal source of the world's supply, until the vast plantations of the East came into production and left to the wild rubber of the Amazonia a very minor place in the world market.

The Amazon Valley was the original home of the *Hevea brasiliensis,* the tree that produces the superior rubber known as "Fine, Hard Pará" or "Up River Fine." Its original habitat was in the higher country about the upper reaches of the southern tributaries of the Amazon. Thus, there is a wide belt of country that extends west from the basin of the Tocan-



Photograph from Dr. W. L. Schurz

LOADING COTTON AT YURIMAGUAS, PERU, FOR THE ATLANTIC SEABOARD

Since the collapse of wild rubber, formerly the chief product of the Amazon Basin district of Peru, cotton planting is assuming some importance. Founded in 1709 by a Spanish missionary, the flourishing town of Yurimaguas takes its name from an Indian tribe which fled from its home in the Amazon Basin to escape slave hunters. The women of the tribe are believed by some authorities to have been the Amazons encountered by Orellana when he descended the river which bears their name (see text, page 445).

tins across the upper courses of all the great north-flowing rivers to the Ucayali, in Peru, where the tree is really native.

Wherever it exists along the lower rivers, as it does as far as the islands of the delta, it has grown from seeds carried down by the current of the rivers.

There are several other varieties of trees that produce "weak" or "weak fine" rubber, but the "brasiliensis" is the only source of the "fine" rubber that established a world standard in the industry.

In 1876 Henry Wickham, now Sir Henry, took seeds from near Boim, on the lower Tapajóz, to London, where they were planted in the Kew Gardens. The seedlings that grew therefrom were transplanted in the Orient and formed the nucleus of the vast plantations of Ceylon, Malaya, and the Dutch East Indies.

There the business was established on a scientific basis impossible in the native rubber industry of Amazonia, and with a potential production that assured its early domination of the world market.*

There are many small plantations in the Amazonia, especially along the lower Tapajóz, in the Maués lowlands, and on the Madeira, some of the trees dating from the sixties of the last century, but they are insignificant in comparison with the plantations of the Orient. However, the Amazonians are hopeful of the establishment of plantations on a scale akin to those of the East, and that would save the traditional industry from total eclipse.

### RUBBER'S CHECKERED CAREER

Rubber in the Amazon Valley has had a checkered history. Shortly before the ascendency of plantation rubber became an accomplished fact, the industry reached its zenith in a burst of unprecedented prosperity. Prices of crude rubber rose for one dizzy moment to eleven shillings ($2.75) a pound, and there were many in the Amazonia who believed that this level of prices had come to stay.

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* See "Singapore, Crossroads of the East," by Frederick Simpich, in the NATIONAL GEOGRAPHIC MAGAZINE for March, 1926.

Those were bonanza times for Pará and Manáos (see page 355) and Iquitos and for every little settlement whose life depended on the price of the "black gold."

Men accumulated more money in a few months in the far interior than they had ever dreamed would come their way, and then swarmed down to Manáos or Pará to spend it in a few days of hectic pleasures, until empty pockets sent them up-river again, to the old, hard round in the jungle or at the trading post.

Champagne and the roulette wheel and automobiles hired by the day had swiftly accounted for the surplus they had brought from the distant seringal. Those more ambitious than the rest traveled to Paris for a few days on the boulevards before the inevitable journey back to the solitude and hardships of the forest.

Most of the great proprietors and traders indulged on a more elaborate scale. As a consequence, but few solid fortunes were built up from the millions that poured into the Amazon during that time.

The name given to an island in the mouth of the Juruá—Ilha da Consciencia, or island where men bound for the rubber country put ashore their conscience—bears witness to the ruthlessness with which some of the ephemeral wealth of that time was made.

After the peak of the boom, prices fell with terrifying rapidity, and those who had not liquidated their high-priced stocks in time were faced with ruin.

This was the beginning of the great crisis, from which dates the present depression of the Amazon Valley. Families, only a little while before in affluence, were impoverished and few business houses survived the shock.

An exodus of thousands of rubber workers followed from the upper rivers. Torsos of great unfinished buildings in Manáos testify to the completeness of the disaster that reduced the resources of the State and of its inhabitants.

The Federal Government of Brazil made efforts to save the rubber industry from utter ruin, but its program was too grandiose for realization. Moreover, the increasing entrance of plantation rubber into the market at that period only aggravated the effects of the crisis.

The Amazonia, especially the Brazilian and Bolivian parts of the valley, have continued to produce rubber in considerable quantities. Temporary rises in the price of crude rubber have given a fitful encouragement to those who had been disheartened by the blow struck at native rubber by the plantation product, but the wiser believe that only the adoption of the plantation system can enable the Amazon country to compete again on anything like equal terms with its formidable rival of the mid-East.

### A REGION OF MYTH AND MYSTERY

In spite of nearly four centuries of exploration, large areas of the Amazonia still await the coming of the first white men. The courses of all the important rivers are well known, but there is much *terra incognita* between some of them, as between the Negro and the Japurá, or between the Santiago and the Pastaza, in the region under dispute between Ecuador and Peru; also a wide belt of territory extending across the northern part of the State of Pará yet remains to be explored.

Many myths and misconceptions regarding the region persist. To most people it is still a sort of antediluvian swamp, where man is perpetually ravaged with fevers and exposed to lurking serpents and carnivora, not to speak of bloodthirsty savages. Even to Brazilians of the south and to Bolivians and Peruvians of the mountain country it is a forbidding and mysterious land.

To Euclydes da Cunha it was an unfinished world into which man had come too soon. Another Brazilian writer, under the spell of da Cunha, has recently entitled a book on the Amazonia "Terra Immatura," and the morbid imagination of Alberto Rangel saw in it an *inferno verde* (green hell).

The Amazonia is neither a hell nor an earthly paradise. By far the greater part of it is entirely habitable by white men, though there are sections where nearly every circumstance of the environment militates against human existence.

# WHERE THE SARD HOLDS SWAY

*With Illustrations from Natural-Color Photographs by Colonel Luigi Pellerano*

IN MOST other parts of Europe fine old costumes of other days have entirely disappeared, but in Sardinia, if one visits the right places at the right time, beautiful souvenirs are still to be found of times when the pageantry of the Middle Ages expressed itself even in the everyday dress of the common people.

There are almost as many variations of costume on this Mediterranean island as there are villages, for each little community has some feature of its own. In one locality a certain combination of colors may be used exclusively, while in another the cut of the apron or the arrangement of the headdress may be the distinguishing characteristic.

These differences in village styles were once to be found all over Europe and may be traced to the remoteness and comparative isolation of places in medieval times. On the Continent they have been ironed away by contact, but in Sardinia efficient and easy means of transport are of more recent development, and some of its mountain solitudes have not yet felt the full force of this standardizing influence.

### A SOBER-MINDED PEOPLE FOND OF COLORS

Although the Sards are essentially a sober-minded people and not particularly addicted to display in other respects, their costumes are riots of blue, scarlet, orange, green, and all the shades that go between. These are often elaborately embellished with embroidery, gold lace and brocade, and gold and silver buttons. Many of the finer ones have been handed down from generation to generation and possess, in addition to their not inconsiderable intrinsic value, the sentimental significance of heirlooms.

While varying so widely in color and style, there are certain features common to nearly all the island costumes. The apparel of the Sardinian woman consists of a heavy skirt of silk or wool, a white waist, a colored bodice or corset, an apron, and a sort of kerchief to cover the head.

The skirt is sometimes of a sober hue, but may be of scarlet, blue, orange, or purple (see Color Plate III). Over it is worn the apron, which is nearly always of a brilliant color and varies greatly in size and shape with the locality.

The women of Aritzo, who wear one of the richest and most original costumes on the island, affect a tongue-shaped apron of scarlet, faced and banded in bright blue. Other villagers wear long, dark aprons much embroidered in bright colors (see Color Plate VII), while still others wear fan-shaped ones with a ruby-red center and a wide white border garnished with figures of blue and gold.

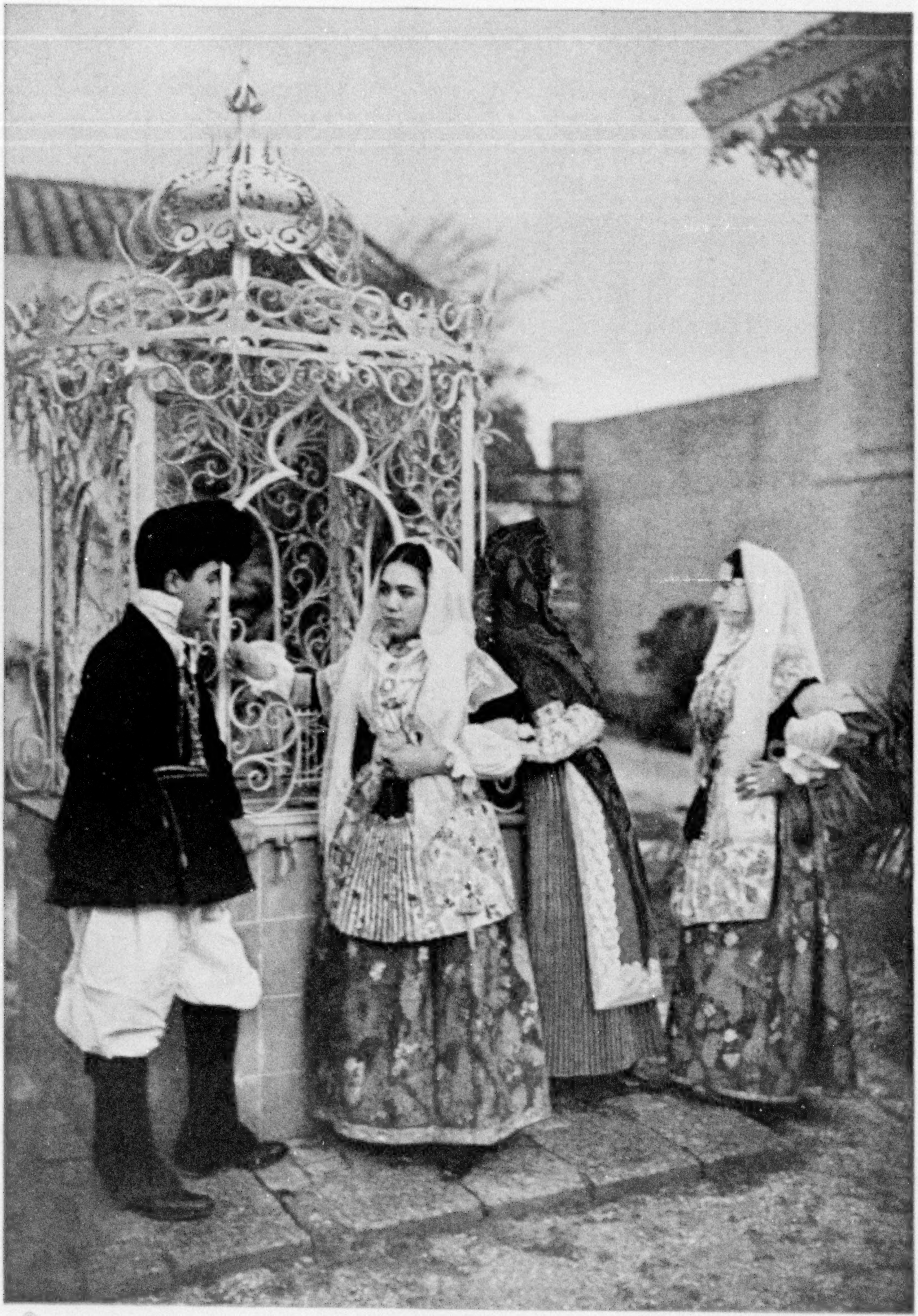
The white waist is worn beneath the bodice, and the kerchief, perhaps white, but generally of bright hue, covers the head and sometimes the shoulders, and is brought together under the chin with a fancy pin (see Color Plates III and VII).

The exact origin of this kerchief or head-cape is unknown, but it dates far back into antiquity, as the head of a statuette of the Goddess Vesta in the Etruscan Museum at Gori, Italy, is draped in much the same style as that popular with the women of Sardinia to-day.

So impressive are the costumes of some of the peasants that the occasion of their leaving church on Sundays and fête days has been likened to a scene at the court of some prince of the Arabian Nights. The flaming reds, blues, and purples are frequently decorated with gold lace and brocade, and as the worshipers descend the church steps with their silver and mother-of-pearl rosaries in their hands, the richness of their costumes, the beauty of their faces, and the background of odd balconied houses all combine to produce a truly medieval atmosphere. Last among the women come the widows, dressed usually all in black.

### THE WIDOW'S MOURNING USUALLY LASTS FOR LIFE

The widow's dress is not the same throughout the island. While in most places she must wear the black habit of mourning all her life and endure an existence as somber as the color of her garments, in some villages only a kerchief of black is worn, and she may continue to gratify her love for bright colors in the rest of her costume (see Color Plate V).



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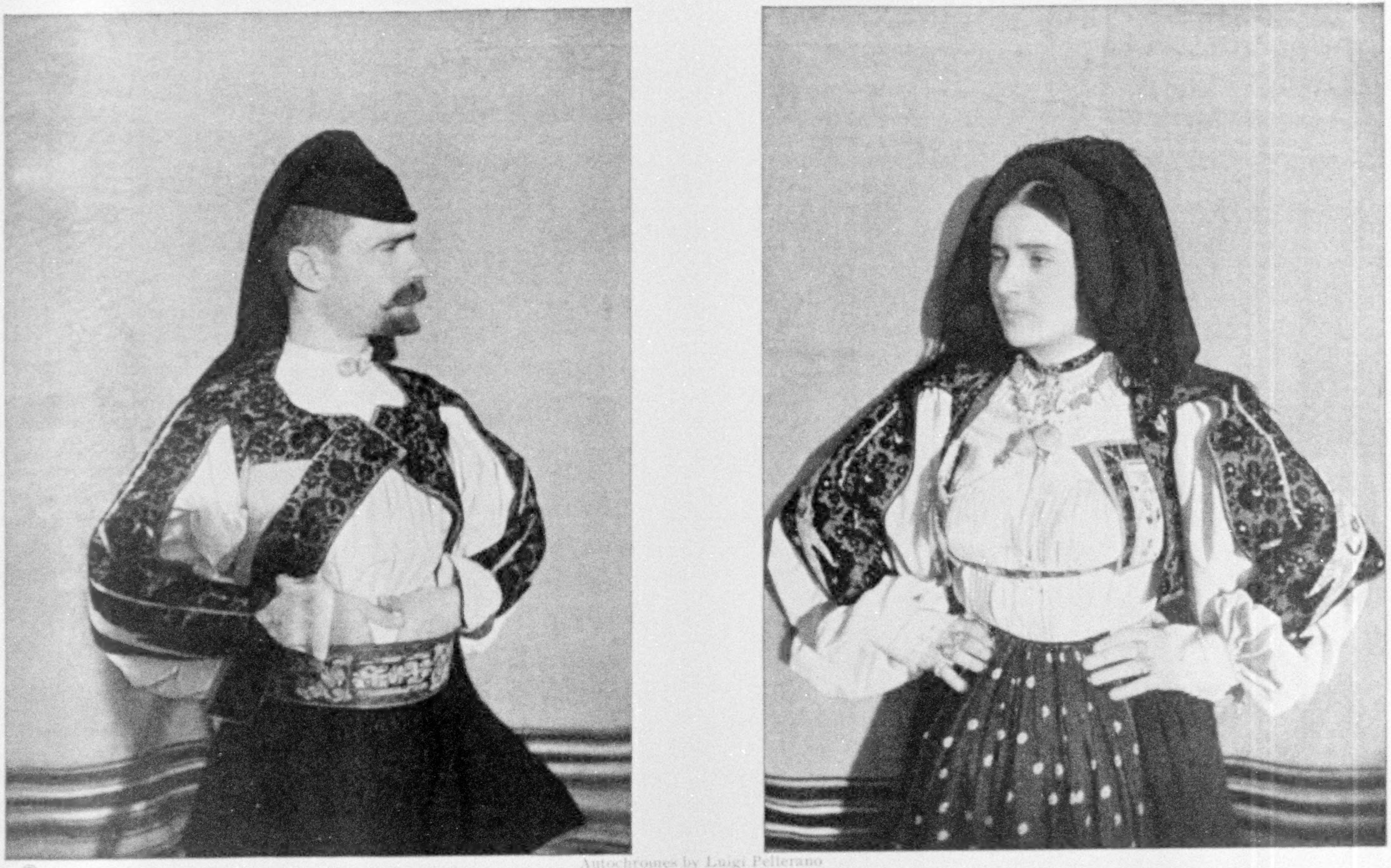
CAMPIDANO COURTSHIP

Among the villages of the great Sardinian plain (*Campidano*), which stretches for fifty miles from citadel-crowned Cagliari to Oristano, these brilliant and costly peasant costumes are seldom seen nowadays. The beautifully fabricated grillwork over the well is a relic of the age when Spain dominated this island hub of the western Mediterranean (see "The Island of Sardinia and Its People" in the National Geographic Magazine for January, 1923).



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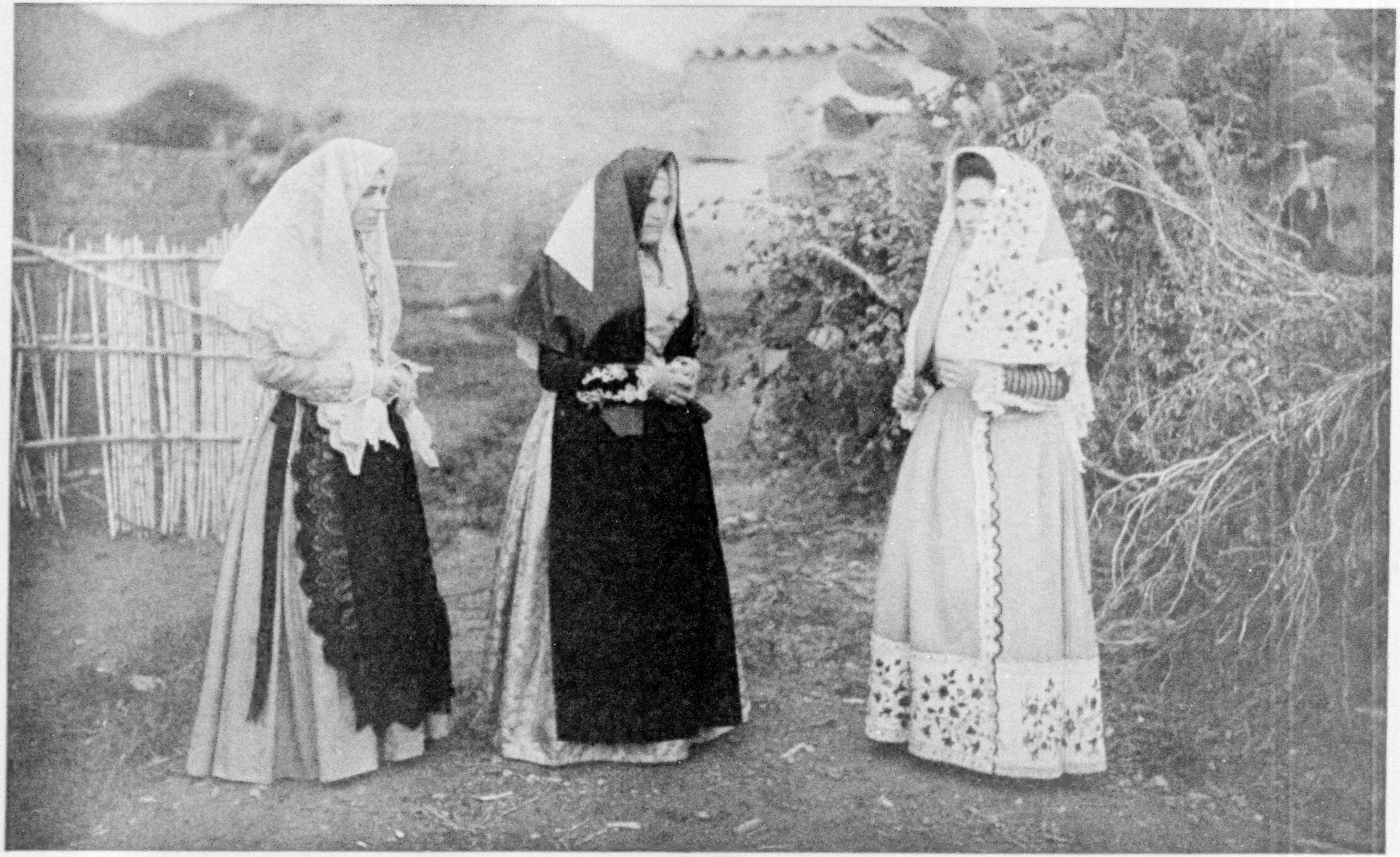
GREEN GIVES THE COLOR NOTE TO OLIENA'S GALA COSTUMES

Only on feast days and Sundays do the men of Oliena wear this gay attire. Many of the Sardinian women have a serenity of expression which would have delighted old masters seeking models for Madonnas.



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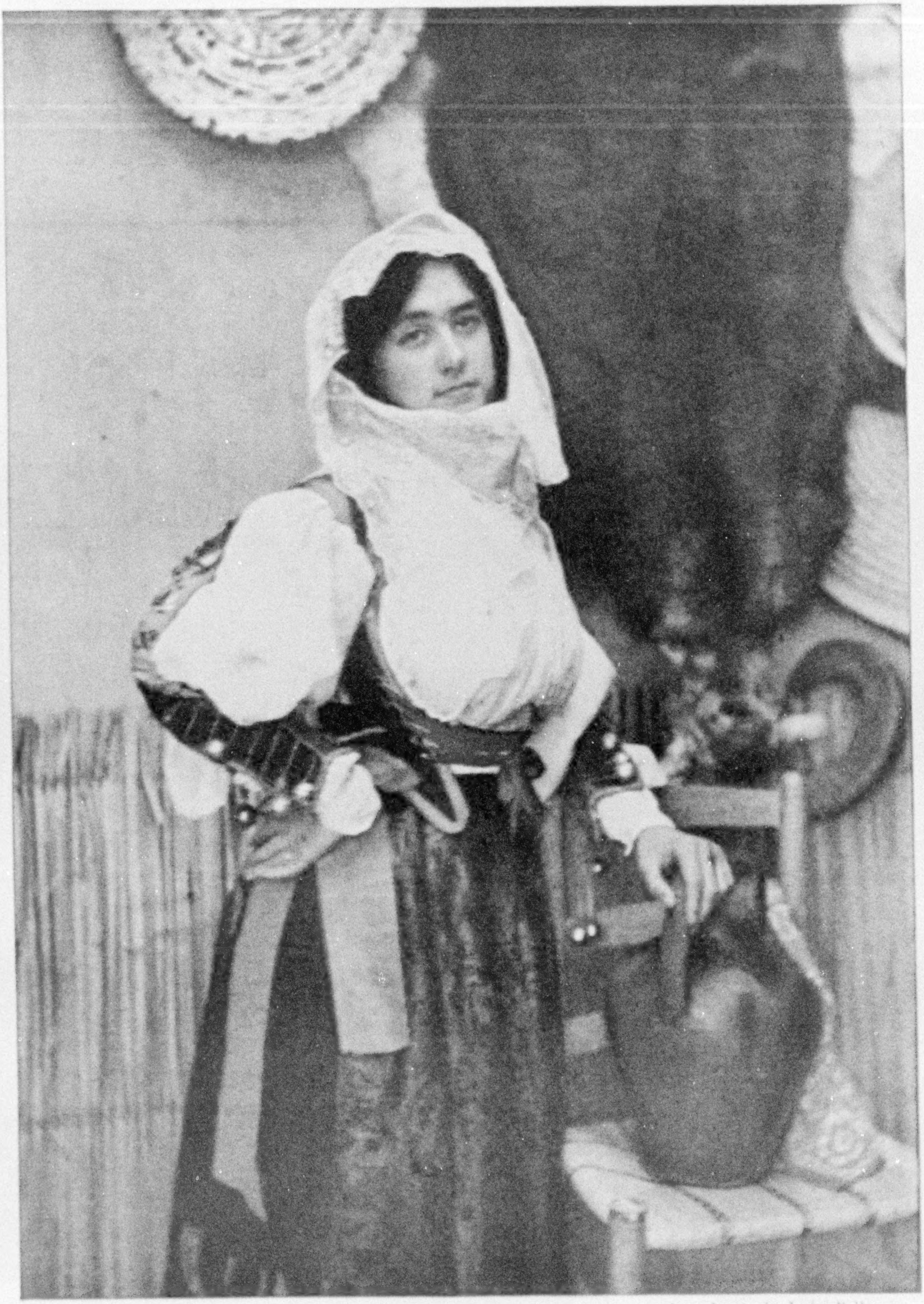
VARIETY IN COSTUMES REFLECTS THE DIVERSE INFLUENCES WHICH HAVE FLAVORED SARDINIAN LIFE

The mother and daughter, at the left, wear the relatively somber garb of the southern mining region, while the brilliant plaited skirt and elaborate embroidery worn by the young woman at the right proclaim her as a resident of Osilo, a northern village which boasts the most beautiful costumes in Sardinia.



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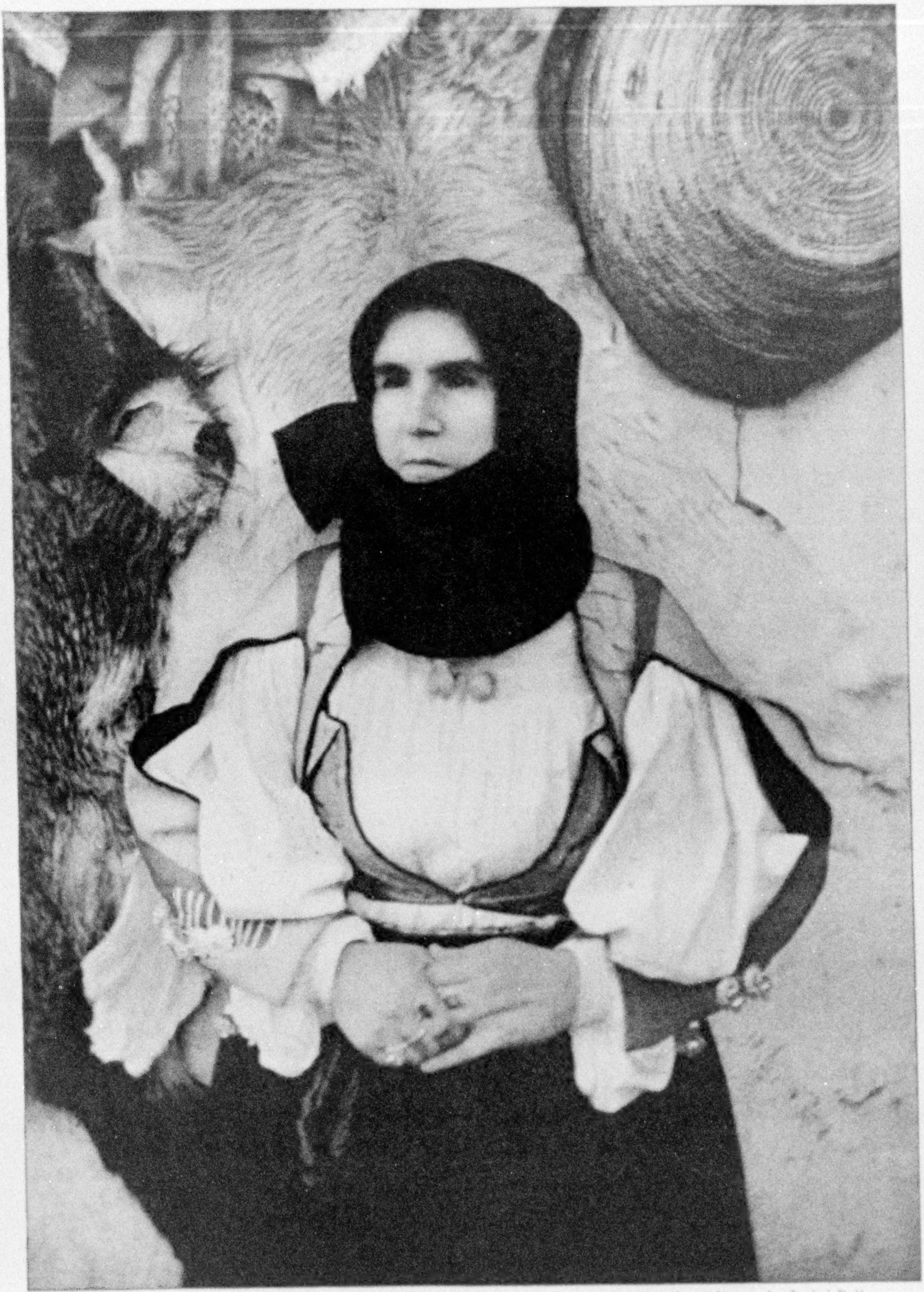
A FAIR SASSARESE

She dwells among the gray-leaved olive groves and vast vineyards of the northern province of Sassari, and speaks a Tuscan dialect, recalling the fact that in the Middle Ages her city was a Pisan colony.



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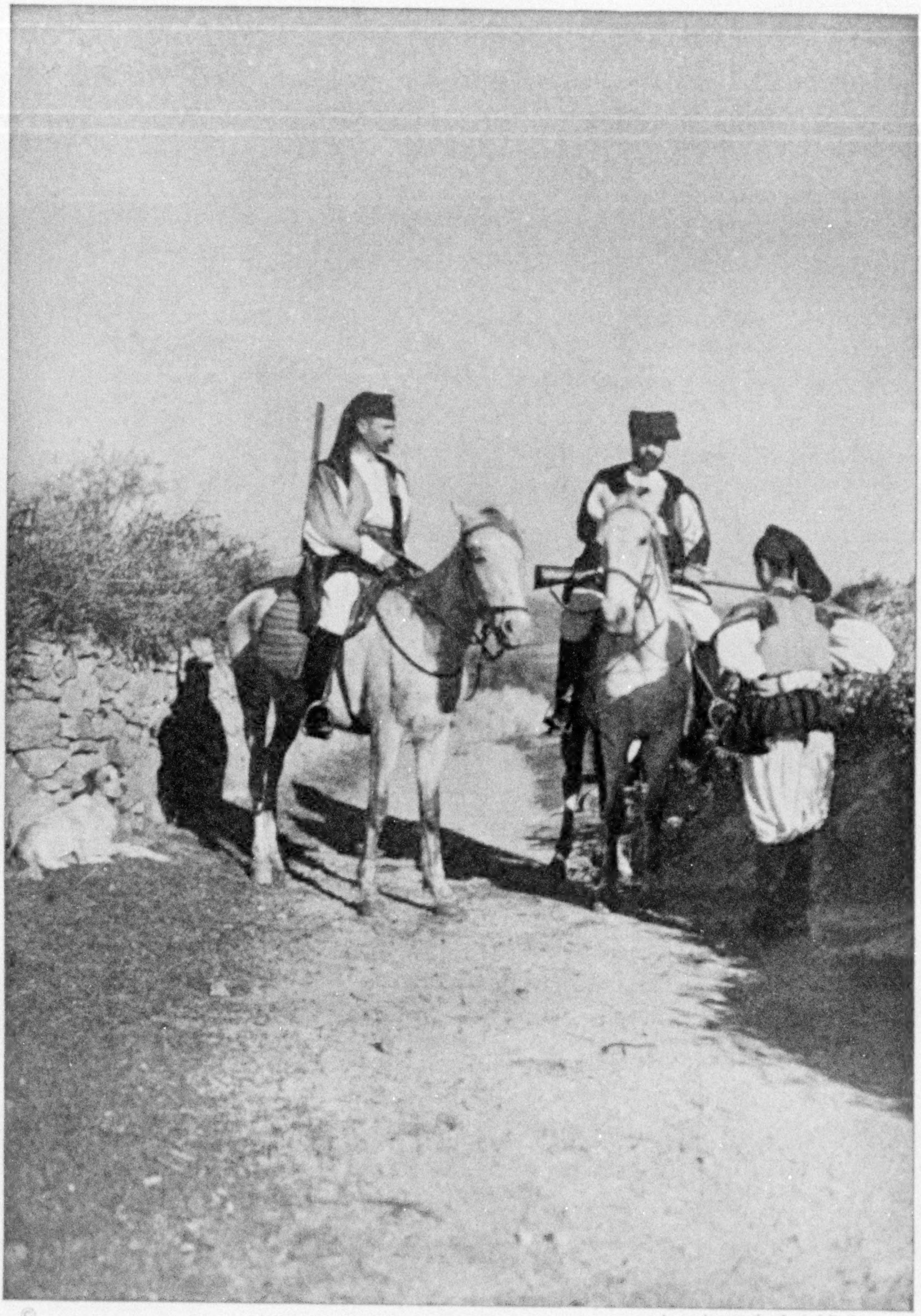
THE WIDOW SWATHES HER FACE IN BLACK

The Nuoro peasant does not permit her bereavement to rob her costume of color and ornament, however. The double button at the neck is a feature which is common to many districts of the island (see also Color Plates II and VII).



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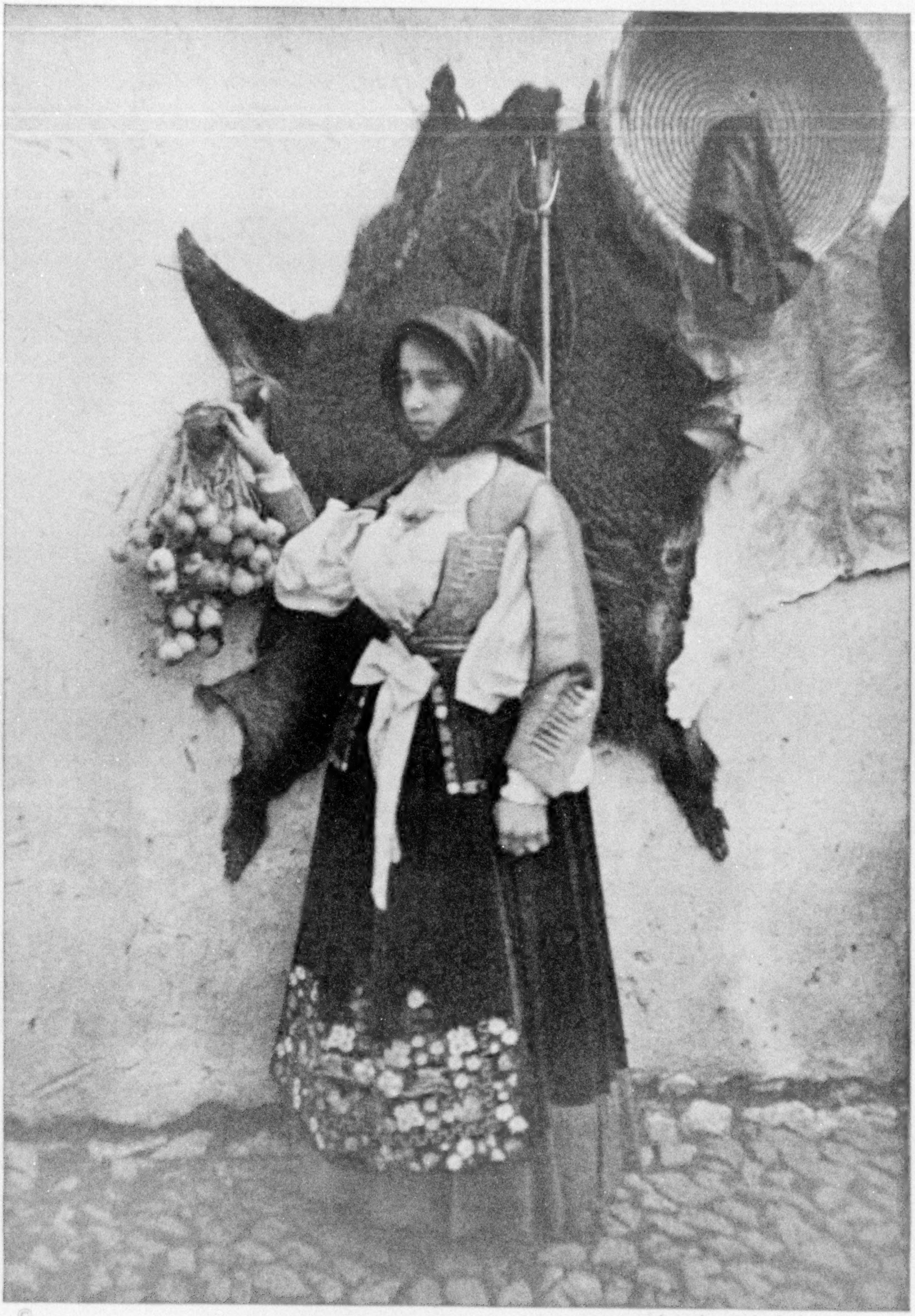
A SERVANT SALUTES TWO GENTLEMEN OF OLIENA

Wealthy farmers, when traveling along mountain trails, still carry their guns, though the banditry of the open road has become a mere tradition. The man on foot carries his lunch in the end of his *berretta*, or long cap.



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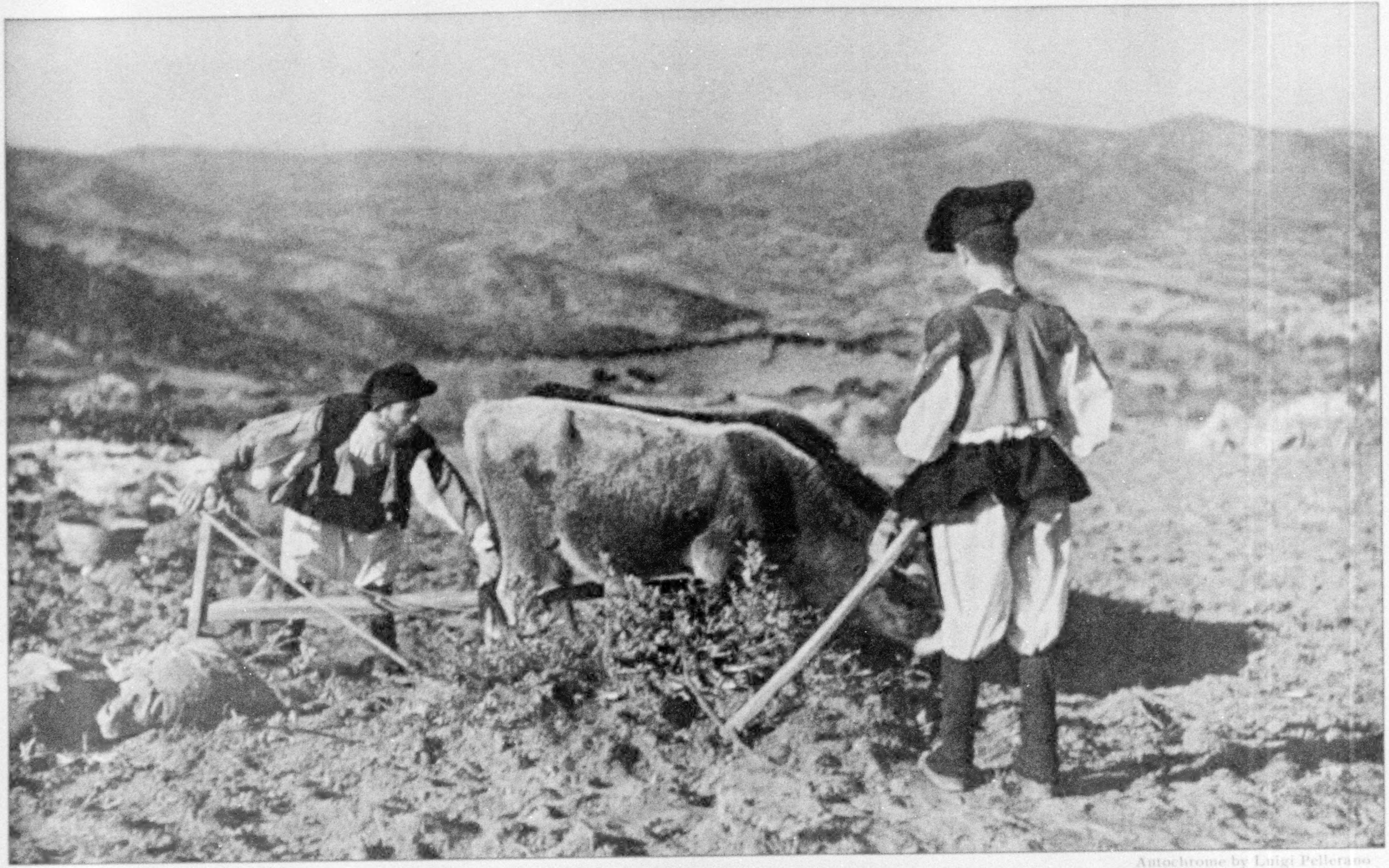
SHE DWELLS IN THE HIGHLANDS OF NUORO

In this section of the island, known as the Switzerland of Sardinia, the women have retained old fashions unaltered, but in most other districts the peasant costumes which have been handed down for generations as family heirlooms are rapidly disappearing.



Autochrome by Luigi Pellerano

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SARTORIAL SPLENDOR DISTINGUISHES THE SARDINIAN OF THE INTERIOR

These mountain farmers consider such bright-colored, everyday woolen garments as fit only for the fields; on Sunday they don their best and go calling on their neighbors. This type of handmade wooden plow is used only in the mountain districts, where the turf is of little depth.

Red or scarlet is ordinarily the color of youth and, with bright blue, is utilized in nearly every variation of costume. There are other colors that have special significance when worn in certain ways, as, for instance, in Desulo a purple border appearing on an apron signifies that the wearer has lost her parents. In some communities if a woman is widowed she must forever forswear the use of scarlet, even though she marry again.

The men of Sardinia also have an interesting heritage of costumes which, while they differ with locality like the women's, show fewer marked variations. Generally speaking, a man wears knee-length or longer, bell-shaped, baggy trousers of white and either leggings of coarse serge or high spats.

Over a white shirt is worn a gayly colored vest, sometimes closed to the neck, sometimes a cutaway, and over this a small doublet.

Around the masculine waist is often wound a Turkish sash, which in ancient times was used to carry a dagger, but now conceals nothing more deadly than a pipe.

The Sard confines his hair beneath a little black skullcap, over which he wears a regular Sardinian cap—a narrow cloth bag, closely resembling the old American stocking-cap—which, in addition to being a head covering, serves as a lunch bag and valise in the daytime and as a pillow at night (see Color Plates I, VI, and VIII).

Many villagers also wear the *ragas*, a peculiar sort of short overskirt not unlike a Scotch kilt (Plate II), or a pair of short, balloonlike top trousers that extend only to the middle of the thigh (Plate VIII).

The shepherds of such villages as Fonni (from the Phœnician word *phanna*, meaning "elevated view") wear the *mastruca*, a sleeveless fleecy sheepskin jacket. Gun, pipe, and bandoleer are carried as inseparable companions.

The Sards are a brave, hardy, liberty-loving people, whose history has been one long and continuous struggle for existence against alien peoples that have so repeatedly assailed their shores. This bitter experience has served to accentuate and develop their native qualities, and the Sardinian soldiers who fought for Italy in the World War well demonstrated their courage and the ability of their race to endure hardships and privations.

Although these people have maintained their individuality in the face of great oppression, they could not but feel the influence and bear some of the impress of the many races that have occupied their island in the last 25 centuries. Italian, Spanish, and Saracenic influences are all to be found in their costumes.

Probably as early as 500 B. C. there is record of the presence of Phœnician settlers in Sardinia, and Carthage maintained her sovereignty over the island until 238 B. C., when the proud mistress of North Africa had to bow to the superior power of Rome and her insular possession was declared a Roman province.

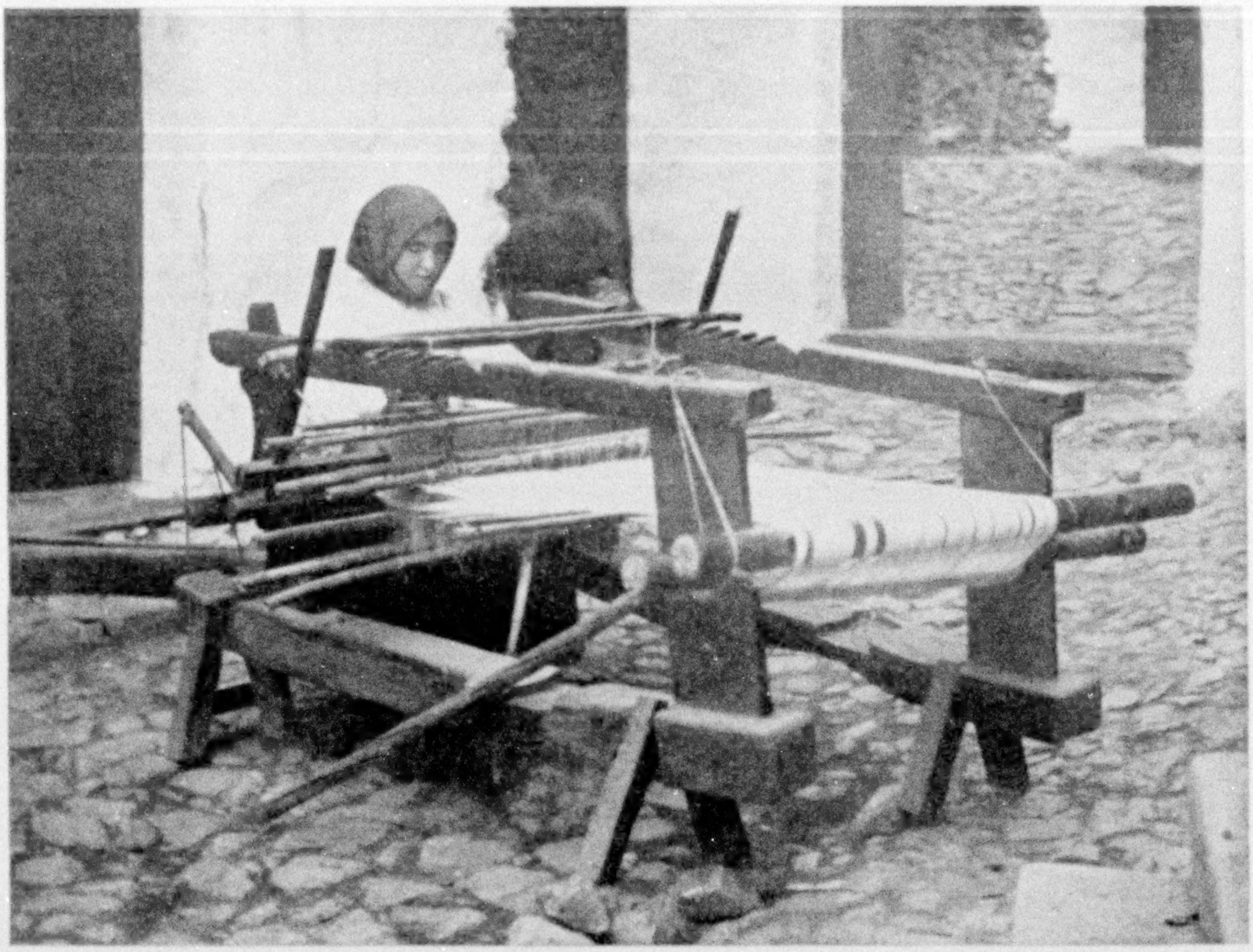
### THE SARDS NEVER SUBMITTED TO THE CÆSARS

But Rome never quite succeeded in subjugating the Sards, for the mountain dwellers of the Barbagia at that early date gave evidence of the same spirit of independence which has ever since been one of their cardinal characteristics. An unending guerrilla warfare was waged against the legions of the Cæsars. Many of the natives were slaughtered and many more were enslaved and sent to Rome, but never were they wholly subdued. Indeed, so refractory were they in servitude that their Roman masters were glad to be rid of them, and the expression "Sards for sale" became a byword.

Following the dispossession of the Romans, the island was overrun in turn by Vandals, Saracens, Pisans, Genoese, and later by the armies of Aragon, Austria, and Savoy, until finally, during the latter part of the last century, the land became an integral part of the united kingdom of Italy.

Development of natural resources will bring to the Sards material prosperity, but it will at the same time mark the beginning of the end of that picturesque remoteness that has been theirs.

The beautiful costumes that have distinguished the island are here reproduced as a valuable historic record through the medium of natural-color plates, made with rare artistic perception by Col. Luigi Pellerano. They cannot much longer resist the advance of modern styles, but will soon join their counterparts in other lands as colorful memories of the past, to be seen only in museums.



Photograph by C. W. Wright

THE WAY IN WHICH SARDINIAN WOOLENS ARE WOVEN

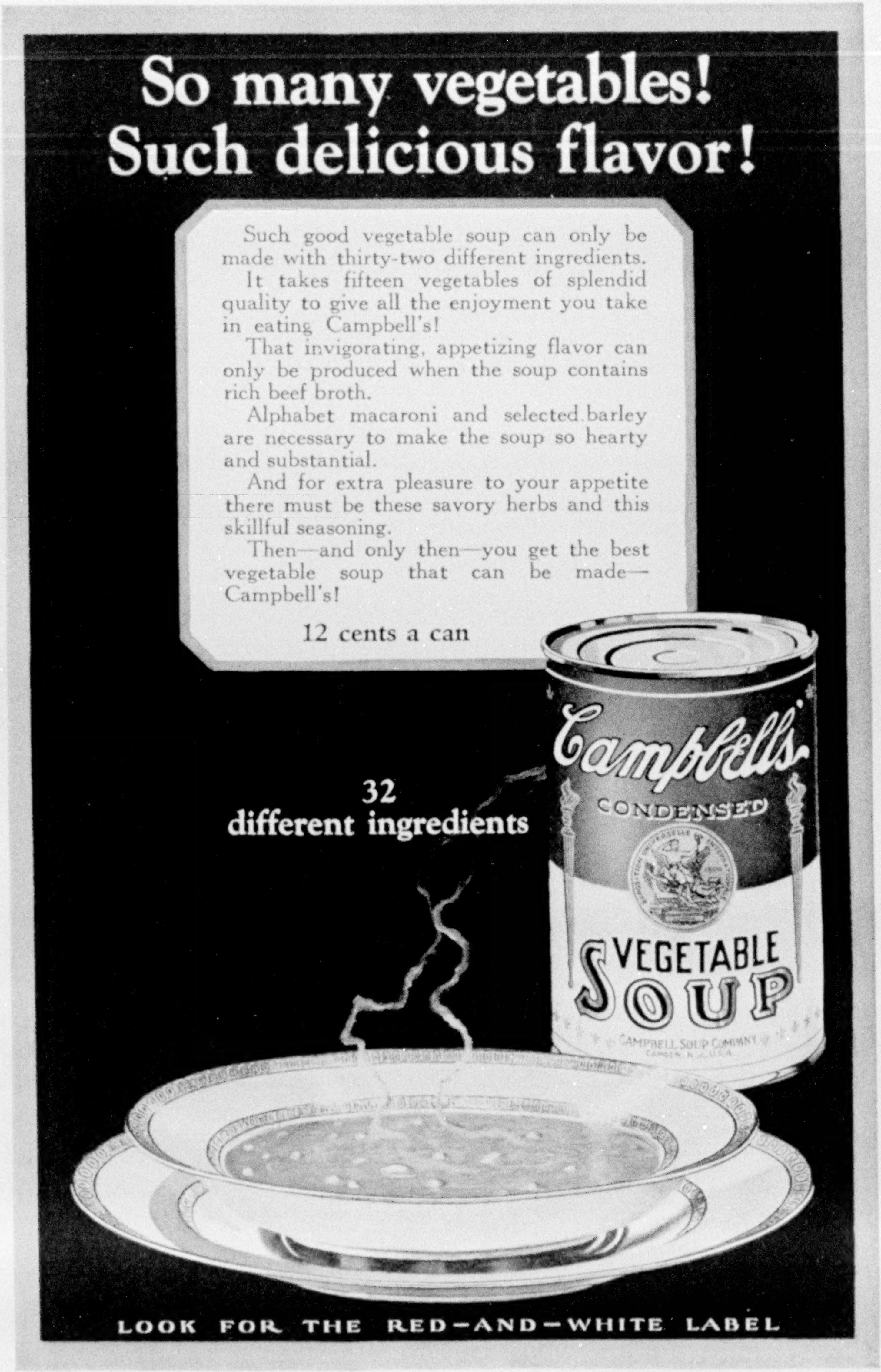
The women of the Mediterranean island are industrious and painstaking. Their flocks supply the necessary wool for the yarn from which are woven many of the costumes shown in Color Plates I to VIII.

# RECENT BEQUESTS BY MEMBERS OF THE NATIONAL GEOGRAPHIC SOCIETY

WHILE the National Geographic Society depends entirely upon the small annual membership fees of more than a million members, its activities for the increase and diffusion of geographic knowledge appeal so strongly to many individuals that bequests are not infrequently made to further these objects.

Among the most recent of such bequests is that of Mr. George True Nealley, a resident of New York City and for 17 years a member of The Society, who bequeathed one-fourth of his estate, or more than $20,000, to the National Geographic Society; one-half of the estate, or $40,000, was left to Harvard University, and the remaining one-fourth to the National Academy of Sciences. The Board of Trustees of The Society has set aside the bequest as a separate fund, the interest on which is to be used for purchasing books for The Society's geographic library, and each volume so purchased is to be marked as a memorial to Mr. Nealley.

Miss Abbie M. White, of Grafton, Massachusetts, who was a member of the National Geographic Society for 20 years, recently died, at the age of 70, and bequeathed "to the National Geographic Society of Washington, D. C., in memory of Edward S. Bowen, late of Pawtucket, in the State of Rhode Island, the sum of $15,000, to be used for the purposes of said Society."



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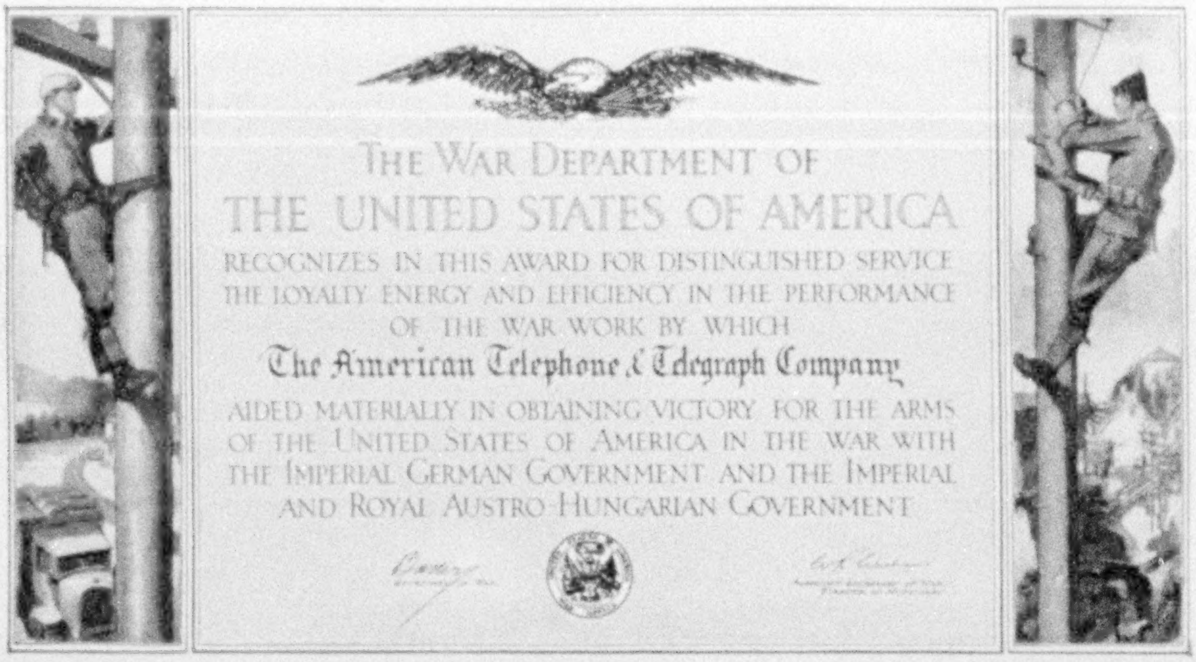

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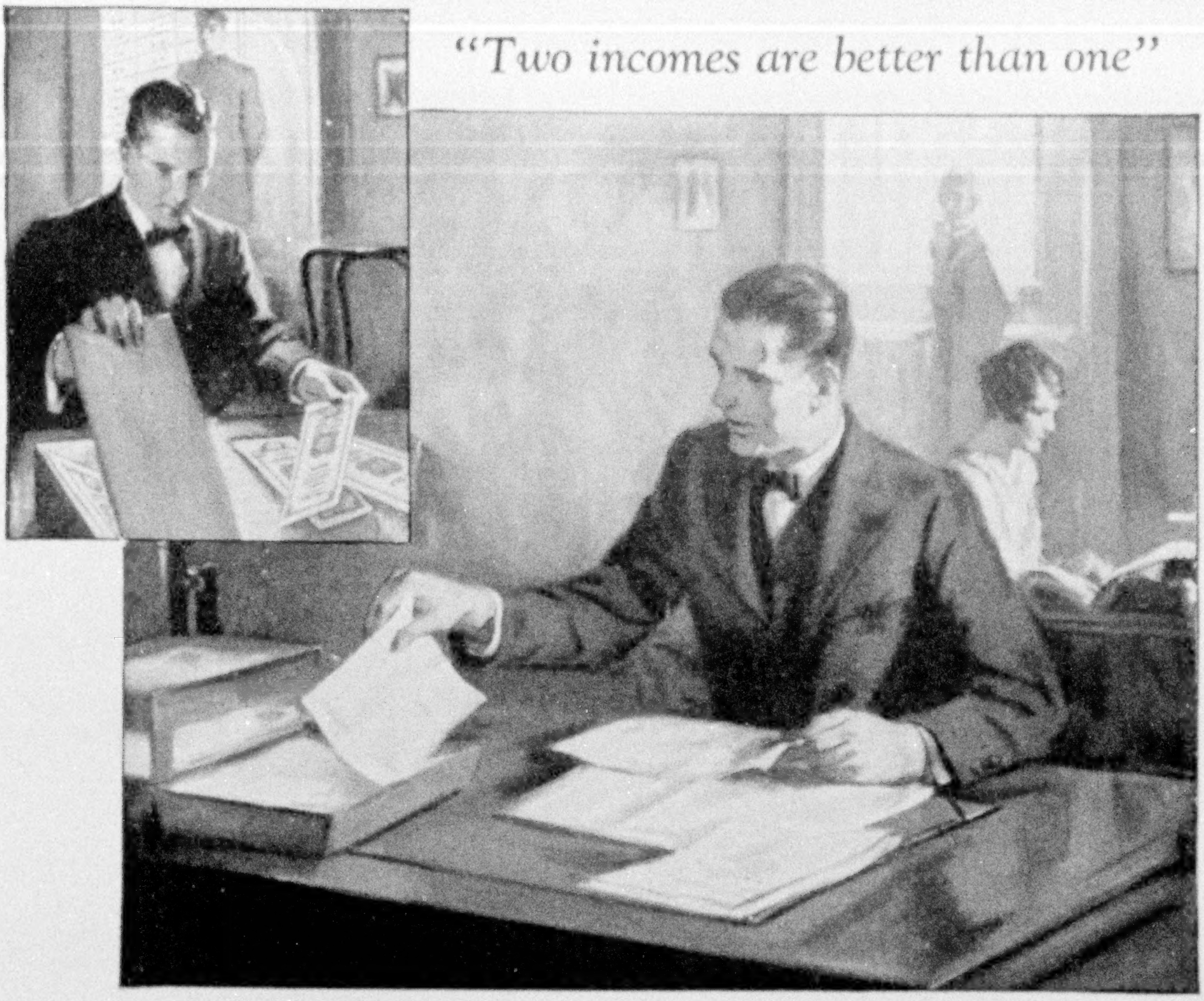

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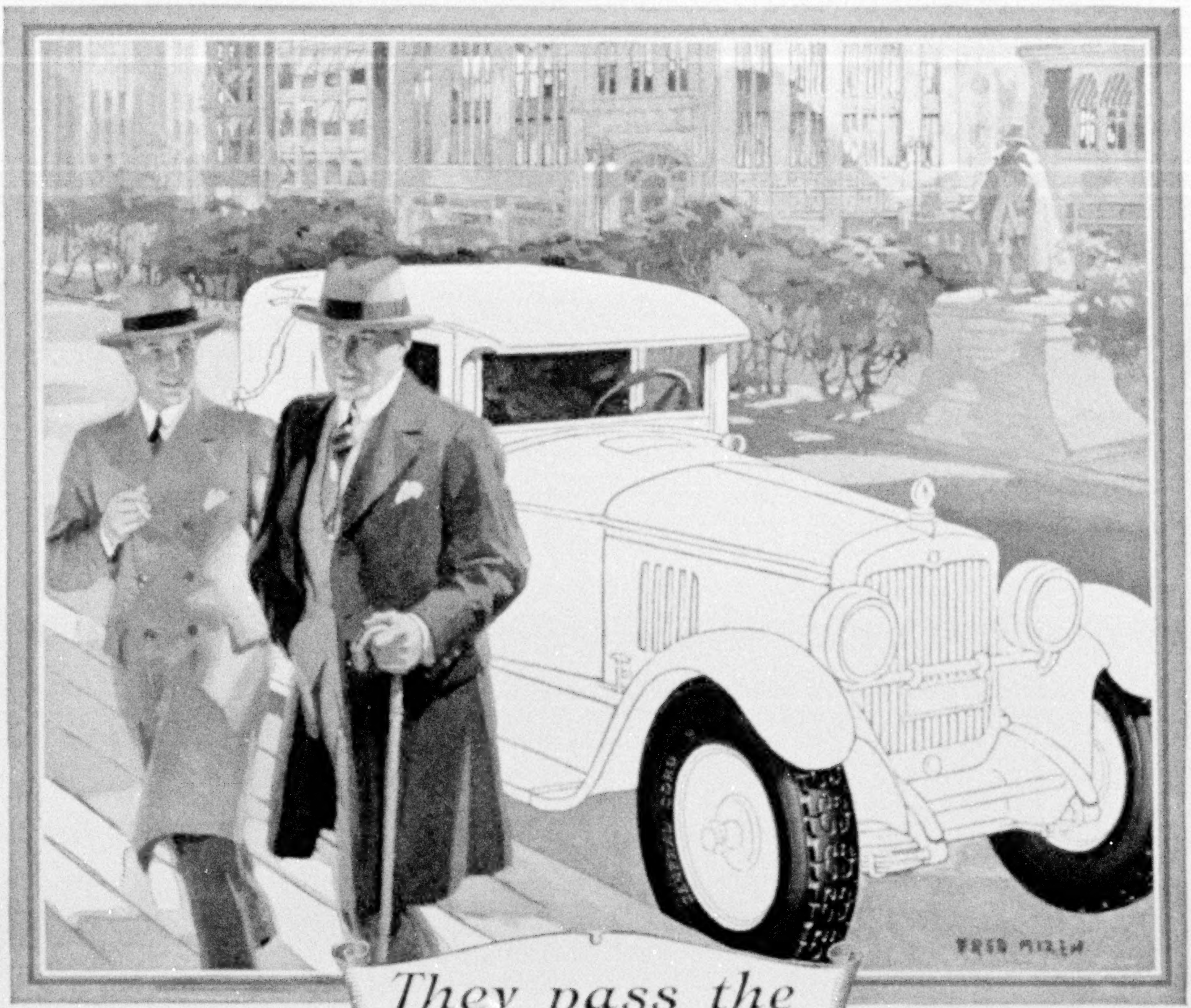

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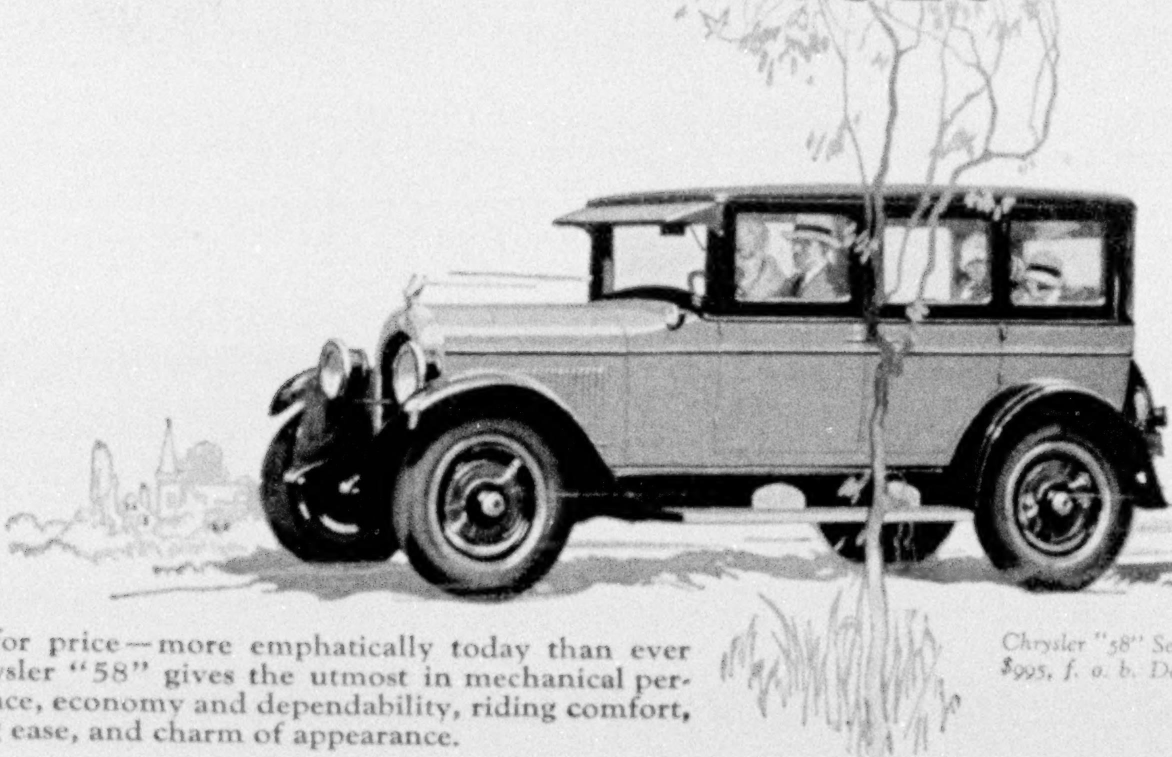

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And perhaps you will better understand the growing preference for the Chrysler "58" when you know that its new lower prices give you the identical performance, identical quality and unmatched beauty which have always placed it above comparison in its field.

Your nearest Chrysler dealer wants to prove, by personal demonstration, the scores of quality advantages, which, at its new electrifying low price of $845, make Chrysler "58" the supreme motor car value of today.

CHRYSLER SALES CORPORATION, DETROIT, MICHIGAN
Chrysler Corporation of Canada, Limited, Windsor, Ontario

CHRYSLER "58"—*Touring Car, $845; Roadster Special, $890; Club Coupe, $895; Coach, $935; Sedan, $995. Disc wheels optional. Hydraulic four-wheel brakes at slight extra cost.*

CHRYSLER "70"—*Phaeton, $1395; Coach, $1445; Roadster, $1625; Sedan, $1695; Royal Coupe, $1795; Brougham, $1865; Royal Sedan, $1995; Crown Sedan, $2095. Disc wheels optional.*

CHRYSLER IMPERIAL "80"—*Phaeton, $2645; Roadster, (wire wheels standard equipment; wood wheels optional), $2885; Coupe, four-passenger, $3195; Sedan, five-passenger, $3395; Sedan, seven-passenger, $3595; Sedan-limousine, $3695.*

*All prices f. o. b. Detroit, subject to current Federal excise tax.*

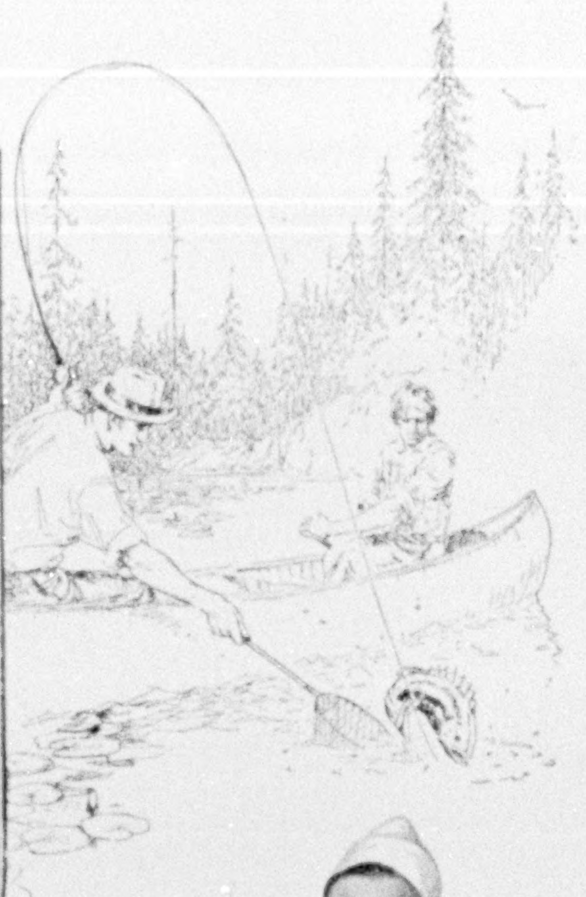
*Bodies by Fisher on all Chrysler enclosed models. All models equipped with full balloon tires.*

There are Chrysler dealers and superior Chrysler service everywhere. All dealers are in position to extend the convenience of time-payments. Ask about Chrysler's attractive plan.

All Chrysler models are protected against theft by the Fedco patented car numbering system, exclusive with Chrysler, which cannot be counterfeited and cannot be altered or removed without conclusive evidence of tampering.

**CHRYSLER**
**"58"**

Table Accessories
Courtesy of John Wanamaker



# *Fashion Decrees* GLASSWARE *for the Table*

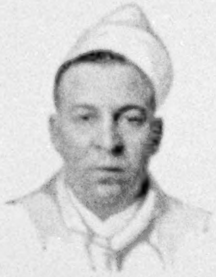
Whether it be when you serve that long-looked-for fish dinner, celebrating *his* triumphant return from waters where the Bass were big, bold and baffling—or no matter what the occasion—*fashion decrees glassware for the table.*

Truly, *glassware* has never been so much in vogue as today. *Glassware* now always dominates all other appointments on the table that reflect discriminating taste.

If you might come to Newark and see how and where Heisey creations have been fashioned with such scrupulous care for several generations, you would surely realize why it is that *glassware* which represents this name has won unique distinction for *quality* in homes where only the best is desired.

Certain it is that Heisey's Diamond H on Glassware is regarded as the symbol of quality, both by the public and the trade. You can always identify Heisey products by the ◊ trade-mark. Look for this when your dealer shows you glassware. Ask to see the new Moon Gleam and Flamingo colors.

A. H. HEISEY & COMPANY
NEWARK OHIO



## *Chef Amiet's Recipe for–Black Bass Palmer*

Try this delicious recipe from a famous American hostelry. Courtesy Chef E. E. Amiet, Palmer House, Chicago.

Scale. Trim off fins of a three-pound Black Bass. Wipe thoroughly.

Cut in julienne two fresh mushrooms, a carrot, a few branches of celery.

Place in a saute pan with two ounces of butter and cook slowly for about five minutes.

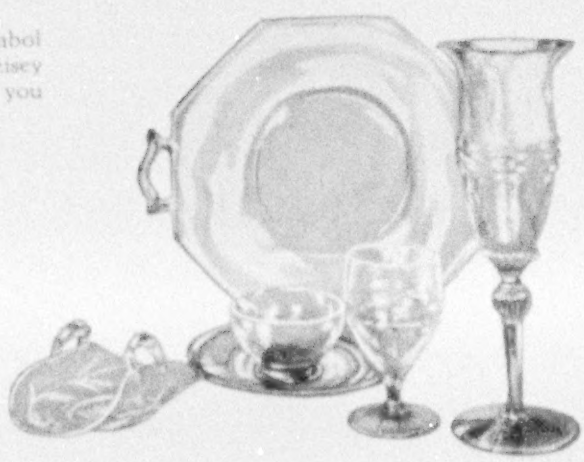
Lay Bass on top, season with salt and pepper, add two gills of hot tomato sauce, and the juice of one lemon.

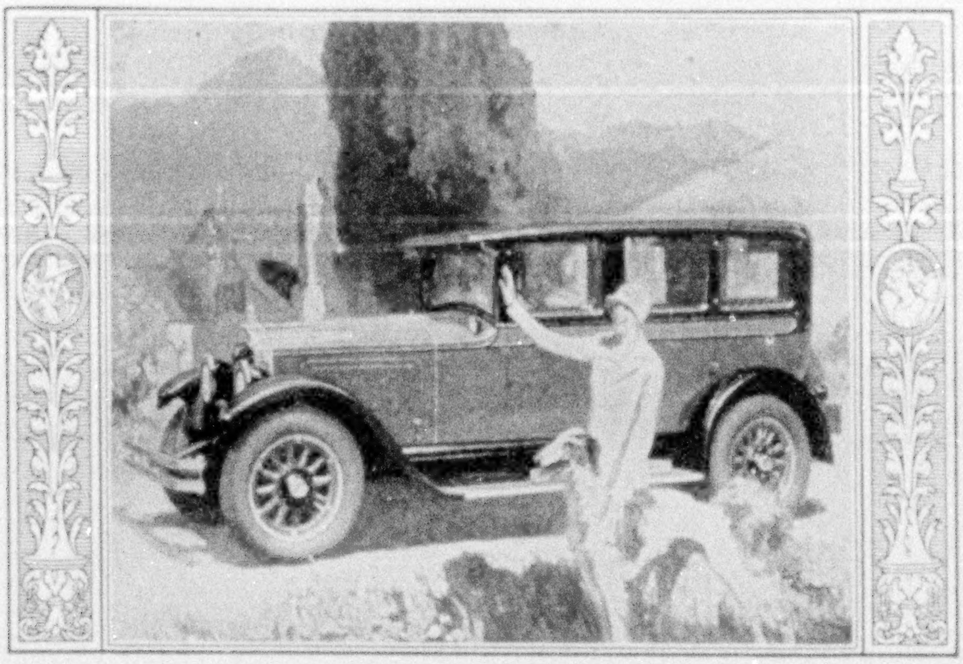
Cover this with buttered paper.

Boil about five minutes on top of range, then set in slow oven for twenty-five minutes.

Remove from oven, take off paper and dress Bass on a hot dish. Give sauce one more boil, pour it over fish and sprinkle a few chopped chives over top. Serve.

# HEISEY'S
GLASSWARE *for your Table*





# A famous professional woman speaks to American women-owners

*"Quite obviously someone with a true sense of the fitness of things conceived the appointments of this motor-car."*
*(Signed)* ELSIE DE WOLFE

About to build a home, the successful business man seeks the best architectural talent available. When Madame herself would have expert counsel as to decorative effects and home-furnishings de luxe, she enlists the aid of an advisor of recognized standing—by preference, Miss Elsie de Wolfe, of Paris, London and New York.

What Miss de Wolfe—premier interior decorator—sees in the Willys-Knight Great Six, its thousands of discerning American owners see—

A body of exquisite beauty—long, graceful lines, distinctive, low—the nearest to smart perfection yet achieved in motor-car design . . .

Its interior—an inviting expanse of automobile—done throughout in rich, heavily-piled Mohair Velour—a subtle cloister-blue, with a beautiful silver bloom. Window panels, dash, and door panels are of genuine walnut, inlaid in dull gold; door-handles, door-releases, window-lifts—all hardware is antique silver type, of chaste, conservative design. . .

Opalescent corner side-lights and ceiling light with separate ebony switches set in antique silver design, smart, antique silver type vanity case, match holder and ash receiver in compartmented walnut case.

In the Willys-Knight Great Six is present every known convenience and elegance ever built into an automobile—everything in exquisite good-taste, each item of its appointments supplementing the other in beauty and comfort.

And this superb automobile is driven by the silent, super-efficient Knight sleeve-valve engine—the only known motor-mechanism that *improves* with use. A sweet-running car, powerful, quiet, smooth; from the first turn of the engine, the power-plant of your Willys-Knight Great Six *improves* in power, in activity, in smooth and silent operation with each succeeding mile!

The new WILLYS FINANCE PLAN offers easy time-payment terms at the lowest credit-cost in the industry.

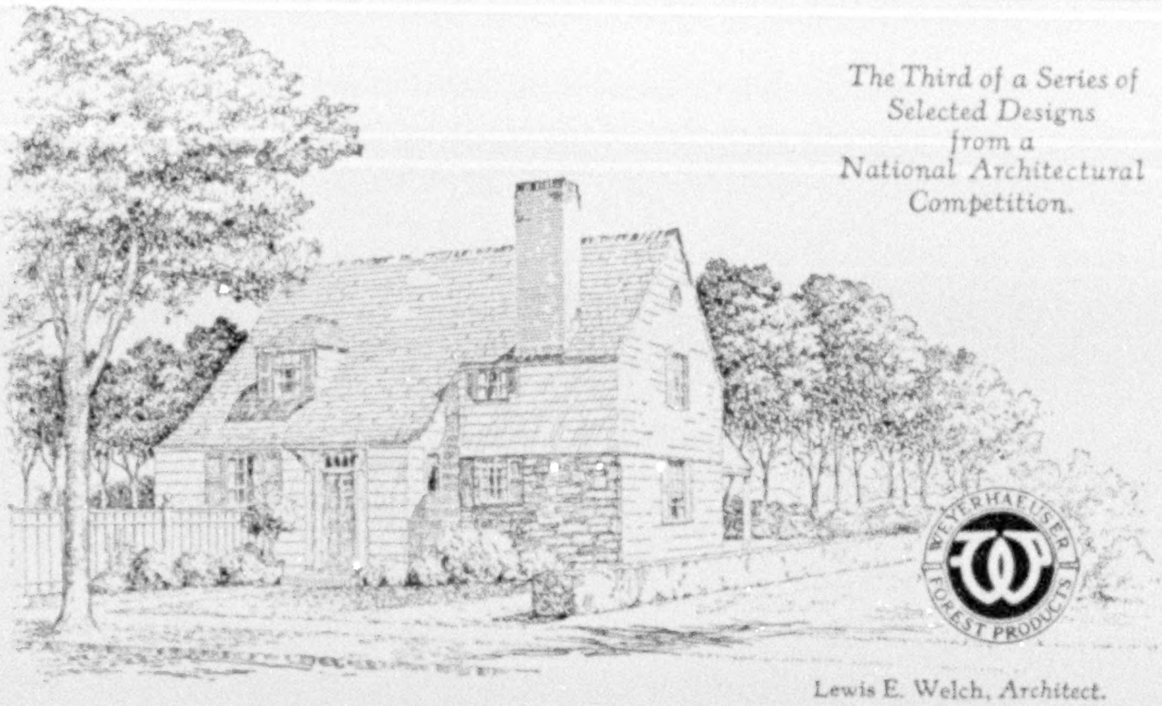
*We reserve the right to change prices and specifications without notice*

Willys-Overland, Inc., Toledo, Ohio
Willys-Overland Sales Co. Ltd., Toronto, Can.

# WILLYS-KNIGHT *Great* SIX

*"with an Engine you'll never wear out"*

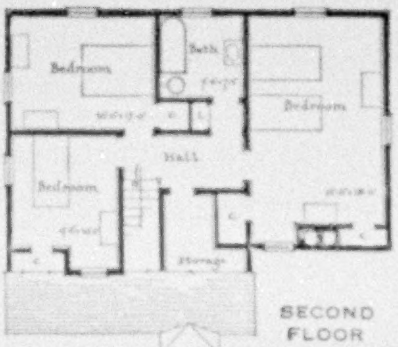
*The Third of a Series of*
*Selected Designs*
*from a*
*National Architectural*
*Competition.*



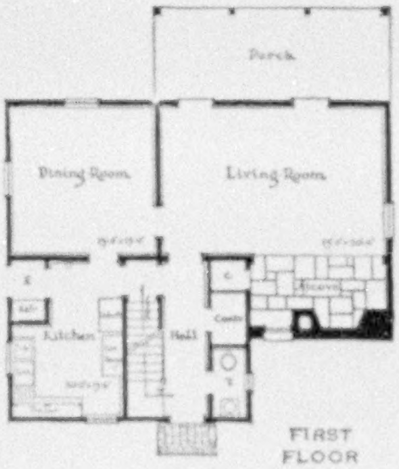
Lewis E. Welch, *Architect.*

# An Unusual and Distinctive Modern Six-Room House

## *Complete Working Plans $15.00*



SECOND FLOOR



FIRST FLOOR

THE charm and coziness of this house would attract attention in any setting, combining as it does the freedom of the country dwelling and the compactness exacted by present-day city and suburban life.

The house is planned to use standard sizes of lumber; and so will build economically.

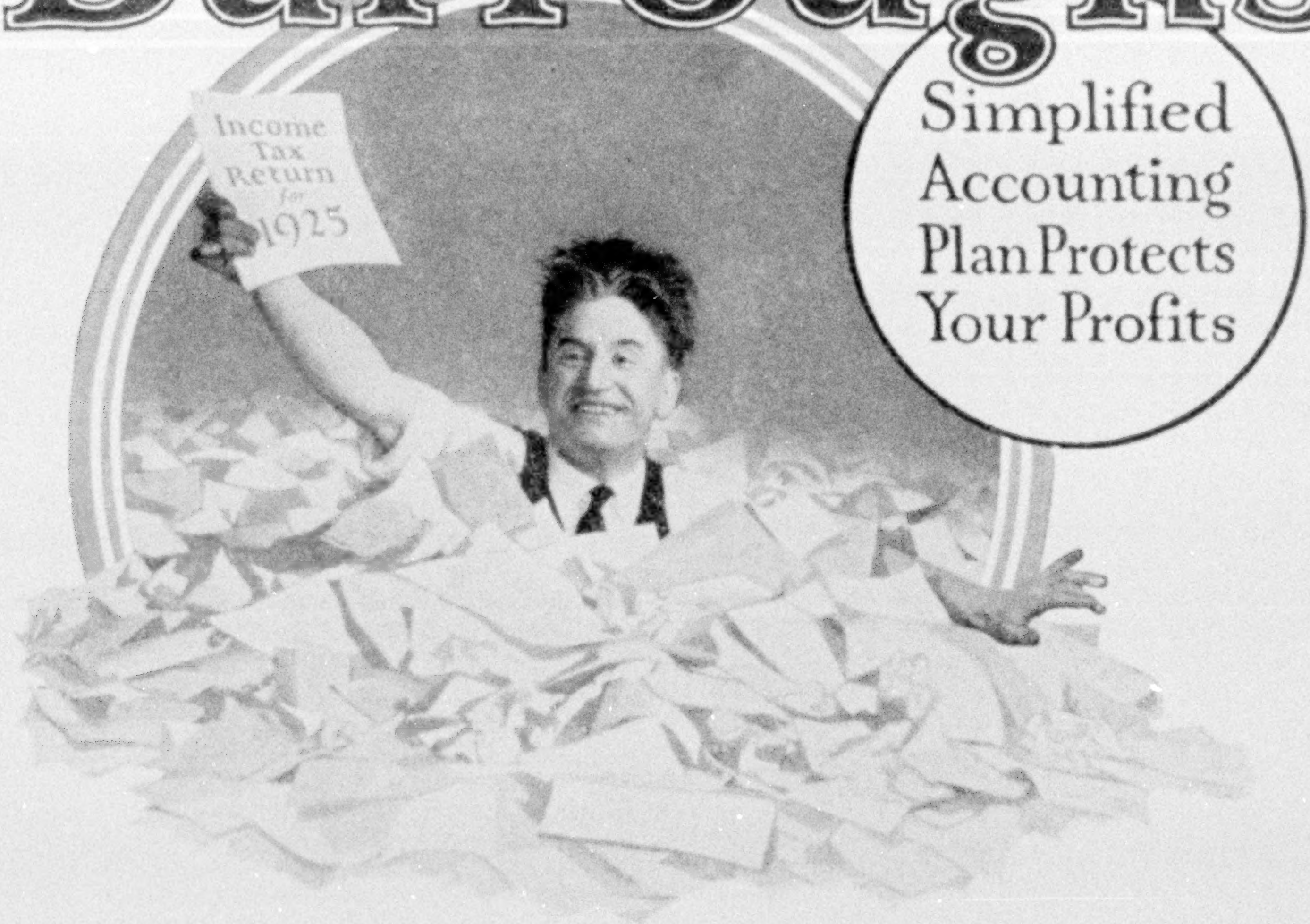
The floor plan is as distinctive as the exterior; note the size and proportions of the rooms, and their convenient arrangement, the lavatory on the first floor and the generous supply of closets. Altogether, a good house to look at and to live in.

If you like this house send $15.00 for a complete set of working drawings from which you can take bids and build this home just as shown.

Or, if you would like to look over the 12 houses in this series, a portfolio of illustrations will be mailed postpaid on receipt of 25 cents.

WEYERHAEUSER FOREST PRODUCTS
809 Merchants National Bank Bldg., Saint Paul, Minn.

# Burroughs



Simplified Accounting Plan Protects Your Profits

# At Last!

Have you, too, just emerged triumphant but worn out from the work of compiling your income tax return? That's the penalty for keeping records that hide the essential facts where you can't find them.

What a contrast with the Burroughs Simplified Accounting Plan! With this plan the essential information about your business is always at your finger tips—ready for Uncle Sam when he wants it—and, more important, ready for you daily when you want to know how and where to make more money.

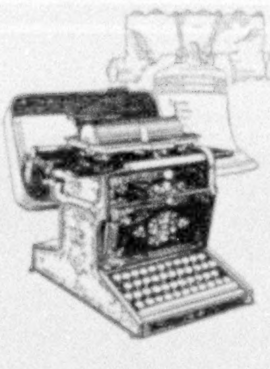
It will make money for you, just as it already has for thousands of others in your line of business.

Can you afford to postpone investigating? Write today.

BURROUGHS ADDING MACHINE COMPANY
DETROIT, MICHIGAN

ADDING · BOOKKEEPING · CALCULATING AND BILLING MACHINES

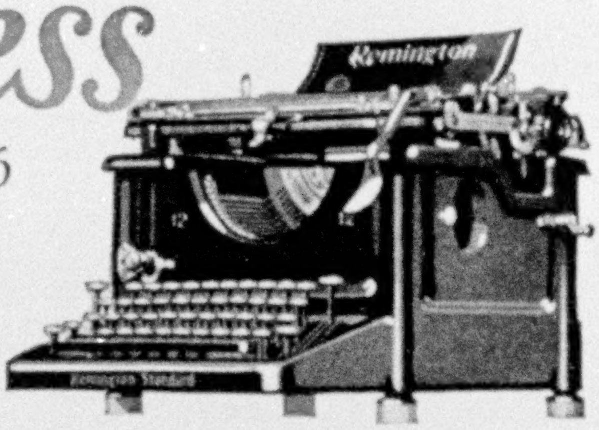
# Remington—*The Official Typewriter of the Sesqui-Centennial Exposition*



*Model 1 Remington*
*The First Practical Typewriter*

# *Fifty Years of Progress*

1876 1926



*Model 12 Remington*
*The Standard Writing Machine of Today*

*Fifty years ago at the Centennial Exposition at Philadelphia the Model 1 Remington, the first practical typewriter and the ancestor of all present-day writing machines, received its initial public exhibition.*

THE Centennial Exposition of 1876 celebrated the One Hundredth Anniversary of American Independence. This year another great exposition is to be held at Philadelphia, the *Sesqui-Centennial*, commemorating the One Hundred and Fiftieth Anniversary of the Nation. The Executive Committee of the Sesqui-Centennial Exhibition Association has designated Remington *The Official Typewriter of The Sesqui-Centennial Exposition.*

This means that Remingtons will be used exclusively for all the clerical work of the immense project, the Remington-Noiseless by the executives, the Remington Standard Models and Accounting Machines by the various departments, and the Remington Portable by the traveling representatives.

The fifty years from the Centennial of 1876 to the Sesqui-Centennial of 1926 cover the entire commercial history of the writing machine. The advent of the first typewriter, the Model 1 Remington, at the Centennial of fifty years ago marked the beginning of a new business era, and the designation of the Remington as the Official Typewriter of the Sesqui-Centennial is signal recognition of its commanding position today as founder and leader of the industry.

The outstanding feature of Remington leadership in this Sesqui-Centennial year is the completeness of the Remington line—which includes *a machine for every purpose.* And every one of these machines is the last word in typing efficiency. Let us study your problems and recommend the equipment that will serve you best.

REMINGTON TYPEWRITER COMPANY
374 Broadway *Branches Everywhere* New York
Remington Typewriter Company of Canada, Ltd., 68 King Street, West, Toronto

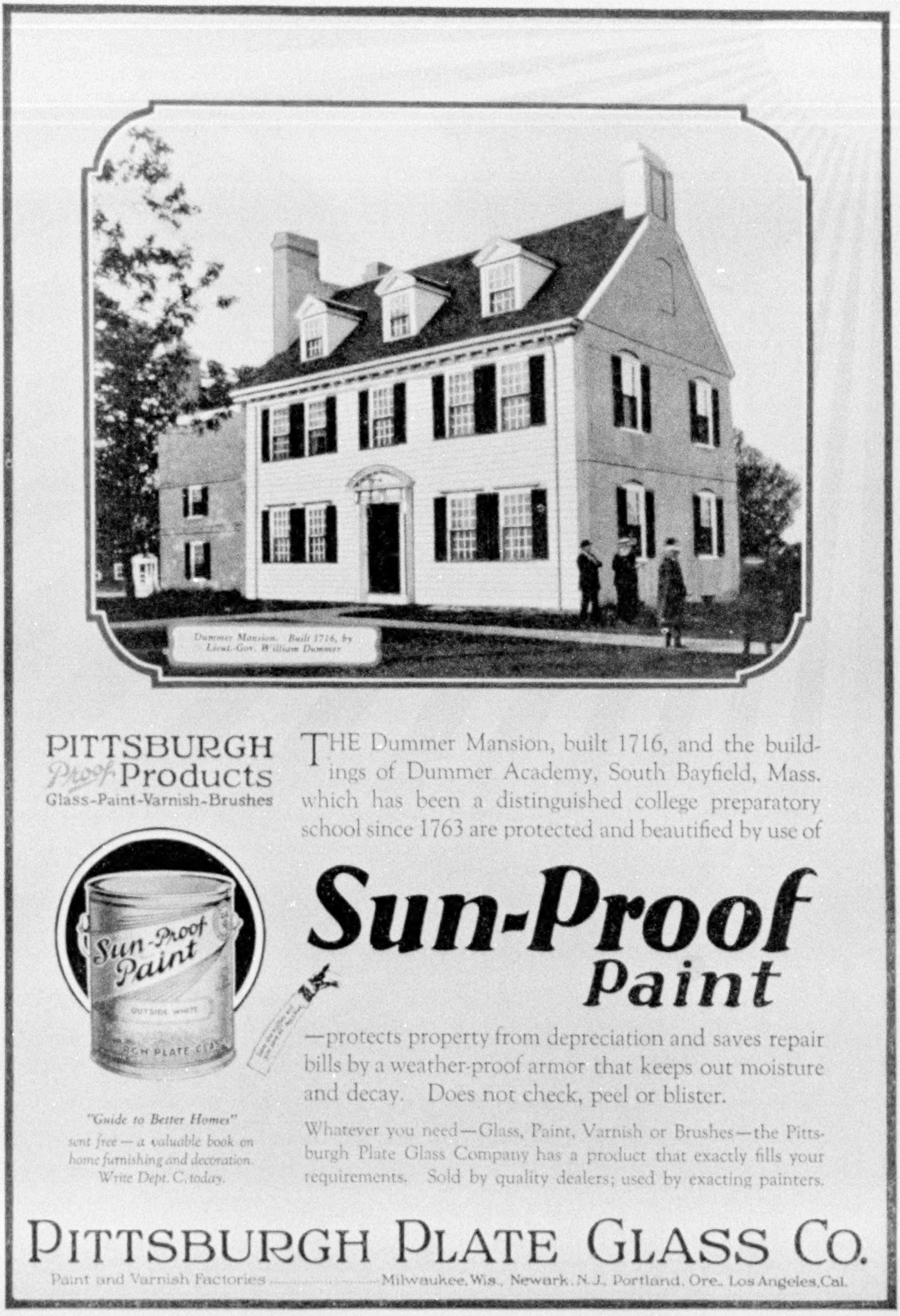
# Remington

## TYPEWRITERS

STANDARD TYPEWRITERS
NOISELESS TYPEWRITER
PORTABLE TYPEWRITER
ACCOUNTING MACHINES

A MACHINE FOR EVERY PURPOSE

Remington-made Paragon Ribbons and Red Seal Carbon Papers always make good impressions


Sun-Proof
Paint
OUTSIDE WHITE
RGH PLATE GLASS

Dummer Mansion. Built 1716, by Lieut.-Gov. William Dummer

**PITTSBURGH**
**Proof Products**
Glass-Paint-Varnish-Brushes

THE Dummer Mansion, built 1716, and the buildings of Dummer Academy, South Bayfield, Mass. which has been a distinguished college preparatory school since 1763 are protected and beautified by use of

# Sun-Proof Paint

—protects property from depreciation and saves repair bills by a weather-proof armor that keeps out moisture and decay. Does not check, peel or blister.

Whatever you need—Glass, Paint, Varnish or Brushes—the Pittsburgh Plate Glass Company has a product that exactly fills your requirements. Sold by quality dealers; used by exacting painters.

*"Guide to Better Homes"*
*sent free — a valuable book on home furnishing and decoration. Write Dept. C, today.*

## PITTSBURGH PLATE GLASS CO.

Paint and Varnish Factories ........ Milwaukee, Wis., Newark, N.J., Portland, Ore., Los Angeles, Cal.

# Refuge!

YESTERDAY they were married . . . today there may be dreams and plans . . . but tomorrow, certain as the seasons come and go, there is going to be a home of their own

It isn't, after all, entirely the economy of a home, or the showplace it may be to friends, or the profit on an investment, that decides them. It is the refuge a home pledges . . . haven that it can be from the day's incessant demands.

"Now we have a home!" . . . you have heard it from the lips of young friends . . . and you may well imagine that this pride is hinting at something more than dollar-and-cents value.

It is those prideful people, wanting a home refuge and home charms for more than a day . . . *for all the tomorrows* . . . who most deservedly insist on good materials and good workmanship. They know the fallacy of slighting construction . . . and then regretting it through the years.

So often they have been best assured of the permanence of the home by the use of Long-Bell trade-marked Douglas Fir and other products . . manufactured with the aim of giving the user maximum construction value!

*Ask Your Retail Lumber Dealer*

THE LONG-BELL LUMBER COMPANY
R. A. LONG BLDG. KANSAS CITY, MO.
*Lumbermen Since 1875*

## Douglas Fir

*—with the trade-mark*

The Long-Bell trade-mark on Douglas Fir lumber and timbers is something more than a name. It not only represents the experience of fifty years as lumbermen—it actually means unsurpassed manufacturing methods and a resulting quality of lumber of unquestionable dependability. With electrically operated equipment of the most modern type, operated according to the highest standards known in the industry, this production has high value for builders planning durable construction.

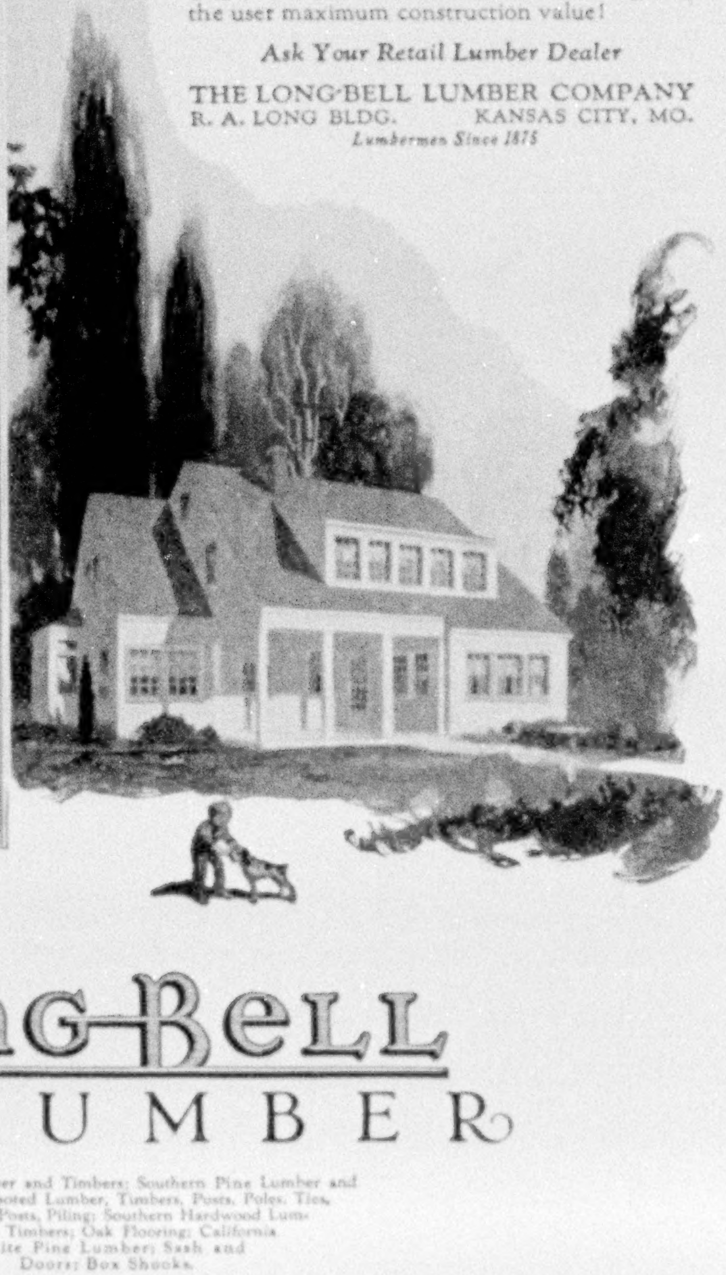
## Southern Pine

*—with the trade-mark*

The years have proved the satisfaction of Long-Bell trade-marked Southern Pine lumber and timbers. Long-Bell production of Southern Pine is the largest in the world; the dependability of this lumber is known wherever Southern Pine is sold.

## To Shippers

Boxes and containers made of *wood* reach destinations safely.



LONG-BELL
*Trade-Marked* LUMBER

Douglas Fir Lumber and Timbers; Southern Pine Lumber and Timbers; Creosoted Lumber, Timbers, Posts, Poles, Ties, Guard-Rail Posts, Piling; Southern Hardwood Lumber and Timbers; Oak Flooring; California White Pine Lumber; Sash and Doors; Box Shooks.

KNOW THE LUMBER YOU BUY

# THE CURTIS INSTITUTE OF MUSIC

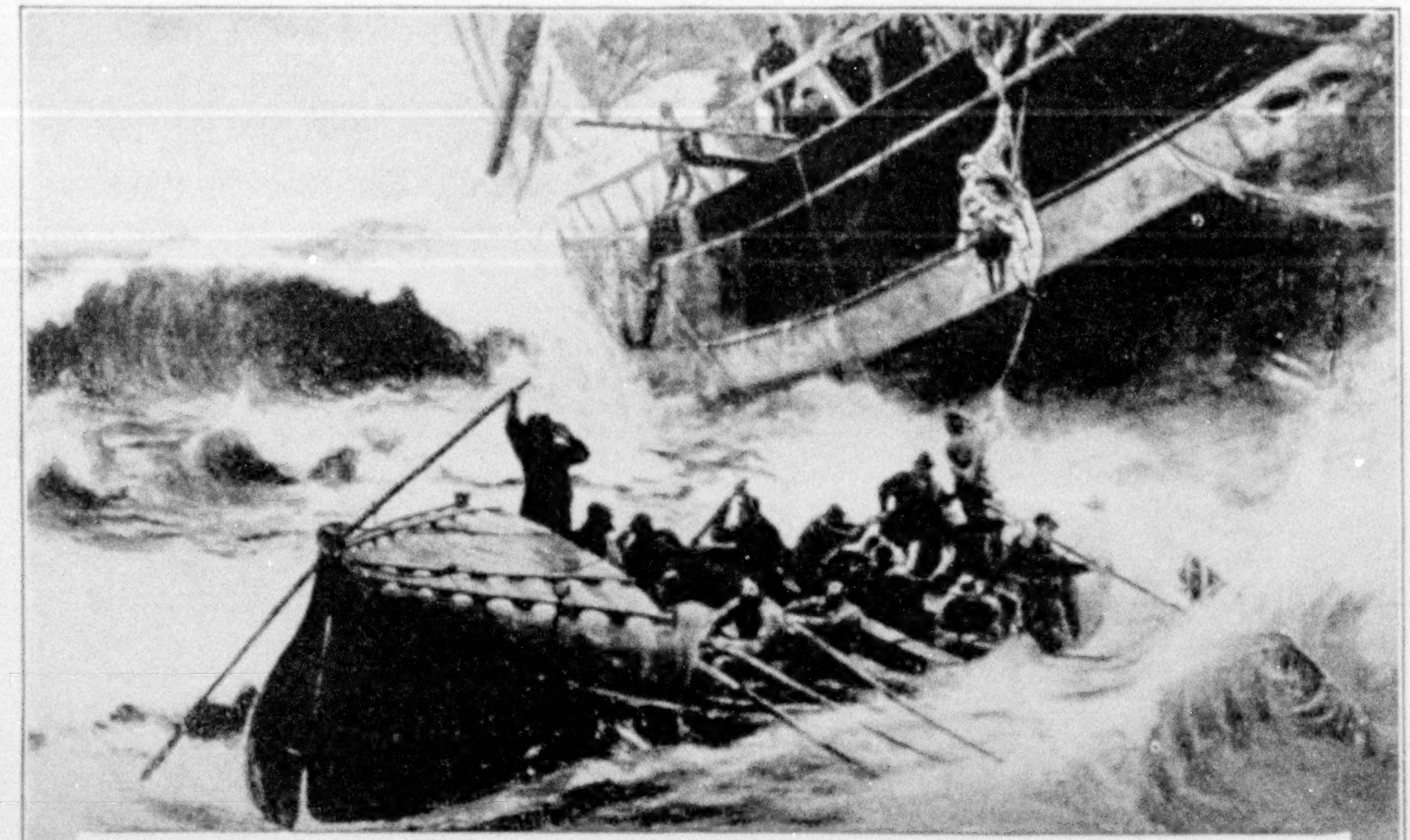
PERMANENTLY ENDOWED BY MARY LOUISE CURTIS BOK

❀

WHERE QUALITY
IS THE ONLY STANDARD

❀

RITTENHOUSE SQUARE
PHILADELPHIA



# Women and Children First

A TRADITION as old as civilization, this deference of man to the weaker and more helpless of the race. That is as it should be.

Unsung heroes, transformed in the twinkling of an eye through some tragedy into magnificent stalwarts, have died smiling, satisfied that by such sacrifice they have saved the life of a woman or a child.

That is the stamp of the thoroughbred.

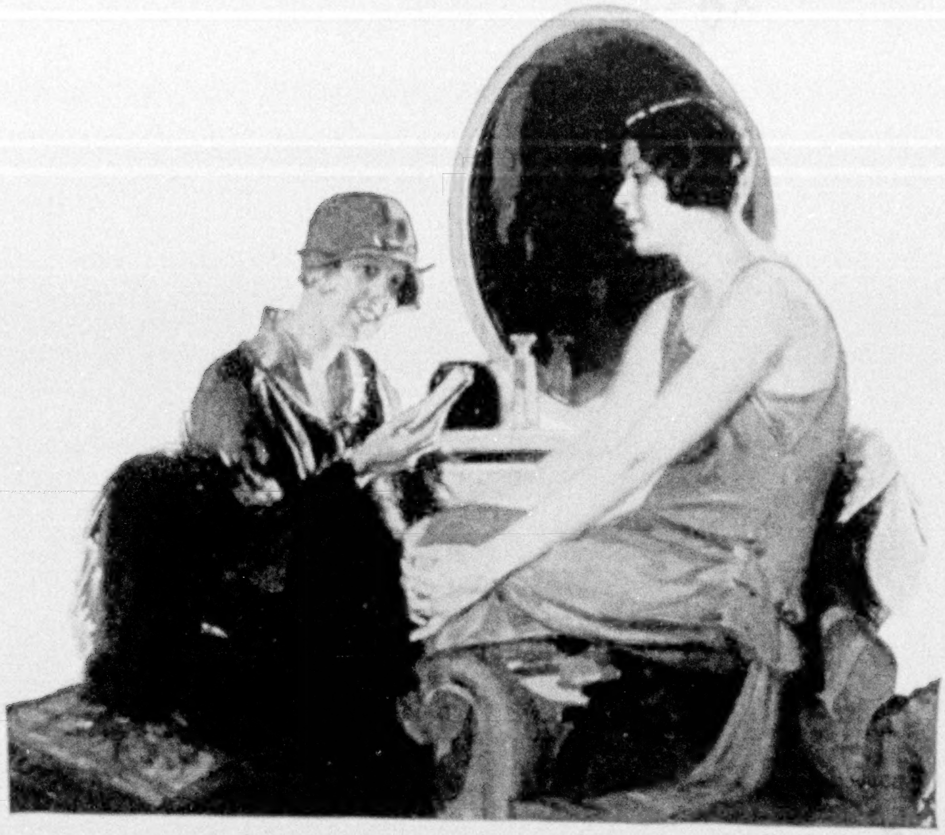
It is an amazing commentary on human inconsistency, however, that the same man who unhesitatingly would go to his death for such a cause in a great emergency will gamble with fate at the risk of permanent injury to those for whom he has the profoundest affection: his wife and children.

## *Keep Your Life Insurance in Force*

THE PRUDENTIAL INSURANCE COMPANY OF AMERICA

EDWARD D. DUFFIELD, *President*

HOME OFFICE NEWARK, N. J.



# "...and Jane, dear...Jack just raved about my teeth."

"I just smiled my prettiest smile . . . and let him rave. I could have said, 'Of course I have beautiful teeth. . . . I've used Colgate's all my life.' But I didn't want Jack to think I was a living advertisement for Colgate's tooth paste."

* * * *

Beautiful teeth glisten gloriously. They compel the admiration of all who see them. And there is health as well as beauty in gleaming teeth, for when they are scrupulously kept clean, germs and poisons of decay can't lurk and breed around them.

### *Remove Those Causes of Decay*

Colgate's will keep your teeth scrupulously clean. It reaches all the hard-to-get-at places between the teeth and around the edges of the gums, and so removes causes of tooth decay. It is the dependable tooth paste for you to use.

### *Washes—Polishes—Protects*

The principal ingredients of Colgate's are mild soap and fine chalk, the two things that dental authorities say a safe dental cream should contain.

### *Use Colgate's Regularly*

Just remember that beautiful, healthy teeth are more a matter of good care than of good luck. Use Colgate's after meals and at bedtime. It will keep your teeth clean and gloriously attractive.

And you'll like its taste . . . even children love to use it regularly.

Priced right, too! Large tube 25c.

Here are children in Passaic, N. J., using Colgate's to fight tooth decay. Colgate co-operates with thousands of school officials and health authorities in teaching dental hygiene.

COLGATE'S
RIBBON DENTAL CREAM

# *This might have been prevented*

"Nerves" Keep Her From Enjoying Life

## Nervous Breakdown May Be Caused By Bad Teeth

### Authorities Trace Many Other Diseases to Poisons of Tooth Decay

It hardly seems possible to those who haven't studied the question, that bad teeth can have such harmful effect upon a person's health.

But just ask your dentist or physician. Either one will give you the sane, simple reasons why decaying teeth may cause heart disease, rheumatism, and even shorten your very life itself.

Nervousness is very often caused by unhealthy teeth. Walker J. Burns, D. D. S., writing in the American Magazine, says:

> "We Americans are peculiarly liable to 'nerve trouble'; and this is one reason why we need to keep careful watch over our teeth."

Today it is recognized that tooth decay is a menace to the nation's health. That is why preventive dentistry is sweeping the United States.

In schools where preventive oral hygiene has been introduced, children have shown striking advance in health and mental vigor, and increased immunity to disease.

Conditions are improving but much must yet be done. Fight tooth decay before it starts.

Give yourself a chance.

## Special Trial Tube Offer

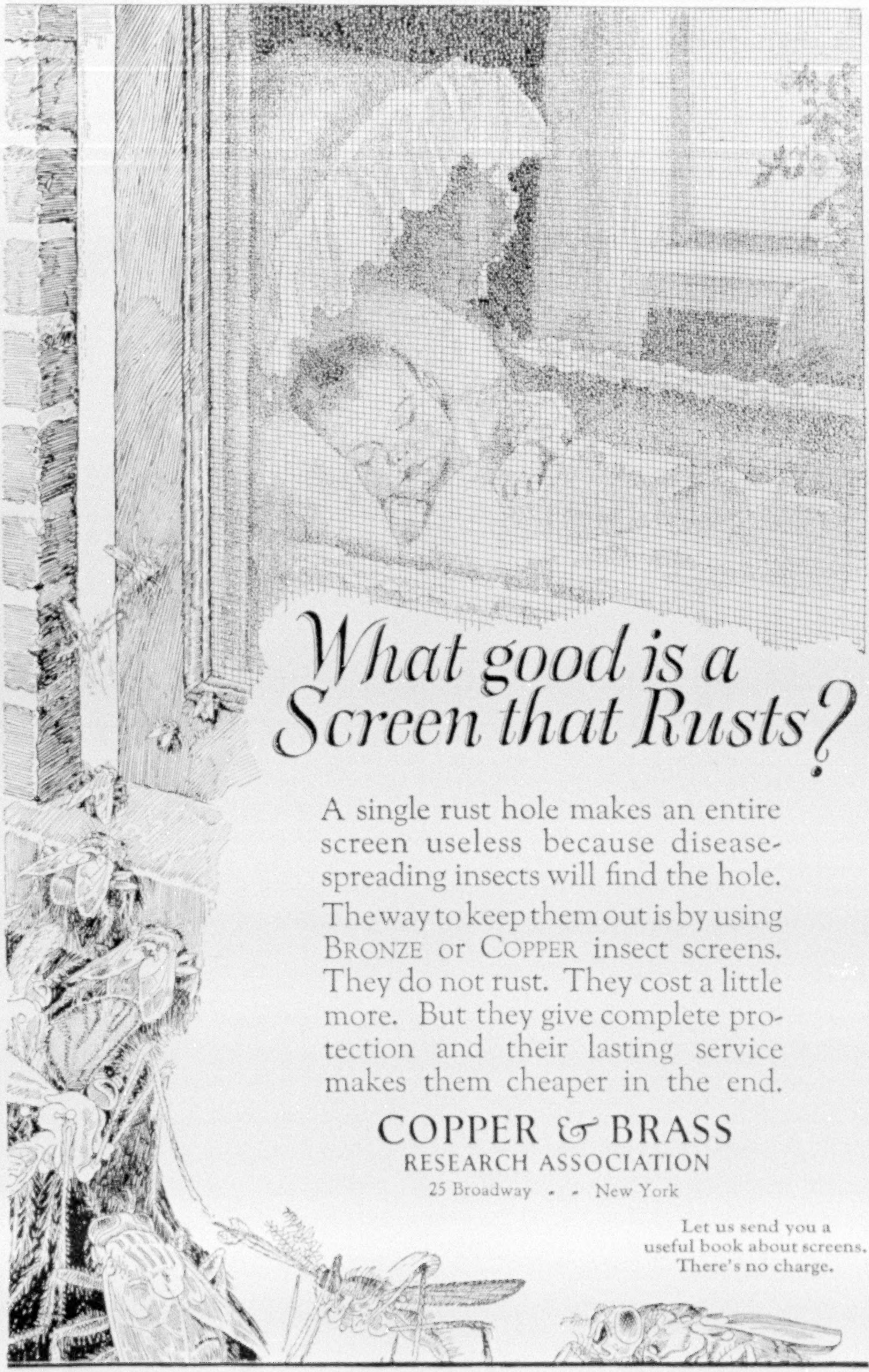
COLGATE & CO., Dept. 713
581 Fifth Ave., New York City

I enclose two cents in stamps. Please send me a generous trial tube of Ribbon Dental Cream.

Name ____________________

Address ____________________

In Canada, 72 St. Ambroise St., Montreal.



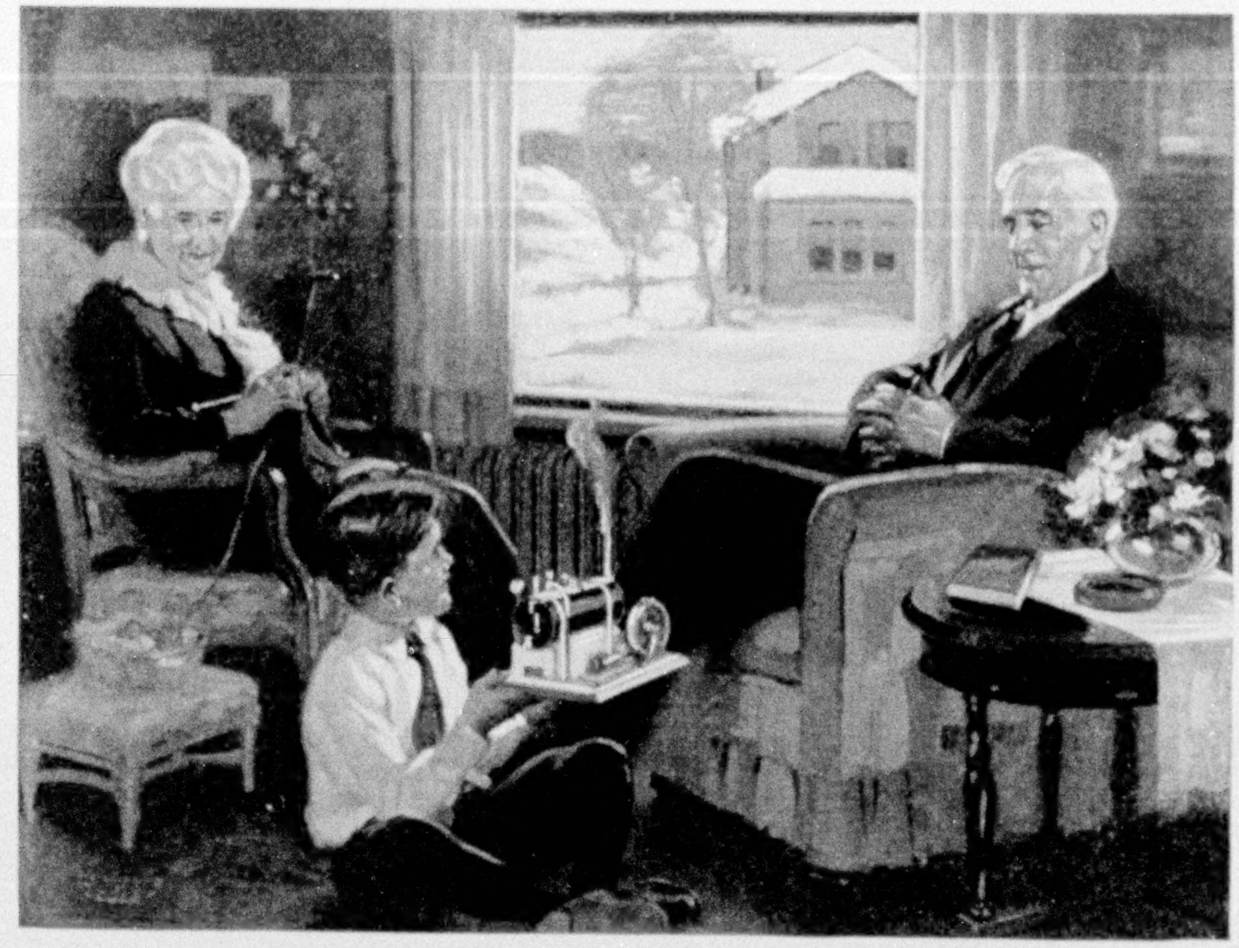
# What good is a Screen that Rusts?

A single rust hole makes an entire screen useless because disease-spreading insects will find the hole.

The way to keep them out is by using Bronze or Copper insect screens. They do not rust. They cost a little more. But they give complete protection and their lasting service makes them cheaper in the end.

COPPER & BRASS
RESEARCH ASSOCIATION
25 Broadway - - New York

Let us send you a
useful book about screens.
There's no charge.



# THEY SMILE NOW
## *at their* Timidity Over Oil Heat

The blessings and happiness that have come to this old couple sums up the story of oil heat as you would like to know it in your home.

In years, they are past three-score. Too old to be burdened with the care of the heating plant. Too needful of even heat to withstand the fluctuations of a temperamental furnace.

### *They are living all over again*

It was difficult for them to decide on an oil burner. It was so new-fangled. Could one be sure of it? Suppose it did not work—what then? How could it hold the temperature at exactly 75 degrees? And the cost. It must be terribly expensive!

They smile now at their timidity. For four joyous years they have basked in generous warmth. They are living all over again.

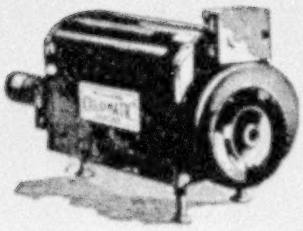
No longer do they huddle over the radiator on the sheltered side of the house. Their Paisley shawls are left in the cedar chest. Upstairs, downstairs, it is always the same. They have seven "living" rooms in place of one.

In this atmosphere of sublime comfort, life for them is a sweet song. The benign influence of even, dependable heat is mellowing their natures. Good health has returned. The ease, the comfort, the cleanliness of it all is adding years to their span. Years to enjoy their children's children.

### *Burner pays for itself*

Happily for these frugal folk, this wonderful transformation has cost them nothing. In four years they have saved enough in fuel bills, labor and extras to pay for their Oil-O-Matic. Each succeeding year will yield proportionate dividends.

Oil-O-Matic burns fuel oil. A cheaper fuel that supplies more heat units per gallon than more expensive, lighter oils. With no part inside the firebox and operating according to the four natural laws of oil combustion, Oil-O-Matic renders a service that makes the random purchase of an oil burner something to avoid.



### *A year to pay if you prefer*

There's an oilomatician near you. Let him examine your heating system and quote you the cost of a guaranteed installation.

Meanwhile, write for "Heating Homes With Oil." The coupon below brings it free.

**WILLIAMS**
**OIL-O-MATIC**
**HEATING**
*World's Largest Producer of Automatic Oil Burners*

Williams Oil-O-Matic Heating Corp.
Bloomington, Illinois N. G. 46

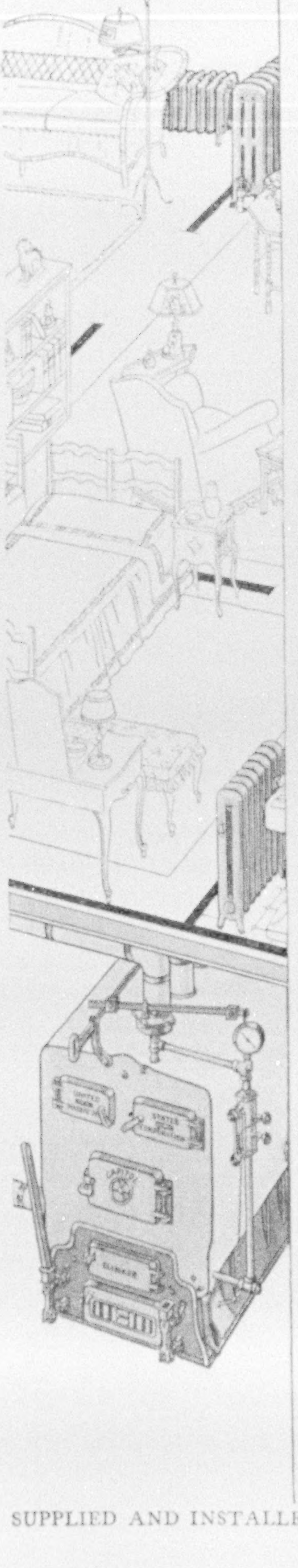
Without obligation, please send me "Heating Homes With Oil," by return mail.

*Name*..........

*Street*..........

*City*.......... *State*..........

DEPENDABLE HEAT ALL OVER THE HOUSE WITH ECONOMY



# June Comfort

## *on every zero morning*

Out the window this morning, you saw the snow melting. Yes, bitter winter is going, but not for good. It is only vacationing. A few short months of warmth and it will be back.

Now, while your memories of zero days are vivid, guard against another winter like the last.

Investigate heating equipment. You will find that with Capitol Boilers and United States Radiators you are given the most definite assurance of heating comfort for every room. No other boiler is easier to operate. No other requires less fuel.

This is the logical time to have a new heating system installed. Consult your contractor Write for a free copy of our illustrated booklet, "A Modern House Warming." Determine now that next winter you will have June comfort on every zero morning.

UNITED STATES RADIATOR CORPORATION
*Detroit, Michigan*
6 FACTORIES AND 28 ASSEMBLING PLANTS SERVE THE COUNTRY
For 36 years, builders of dependable heating equipment

GUARANTEED HEATING

*Your contractor receives a written guarantee on the heating capacity of every Capitol Boiler. No other heating equipment assures you satisfaction so definitely.*

# Capitol Boilers
*and*
# UNITED STATES RADIATORS

SUPPLIED AND INSTALLED NATIONALLY BY ESTABLISHED HEATING CONTRACTORS

*With a little mirror, look* **behind** *and* **between** *your teeth, in the places seldom reached with a brush. That's where decay and tartar work destruction.*

# *Behind and between*

## your teeth---that's where trouble starts

NEARLY forty years ago, Dr. W. D. Miller, an American dentist practicing in Germany, demonstrated that colonies of acid-forming germs attach themselves to the enamel by means of the sticky mucin film. If allowed to remain in one spot for any length of time, these germ colonies secrete sufficient acid to eat through the enamel.

After Miller's discovery of the cause of tooth decay, it was thought that decay could be prevented simply by killing the germs. Thus antiseptic dentifrices were introduced. Needless to say, they proved unsuccessful, for the germs were apparently snugly protected in, or under, the heavy accumulation of mucin (mucin plaques).

By and by, scientists agreed that it was necessary to find a mucin solvent, so that the germ-laden mucin film could be thoroughly removed, especially from **the inaccessible spaces between teeth, where a brush cannot be effectively applied.** It is in these places that your dentist looks first for trouble—and invariably finds it.

After nearly 30 years of fruitless search for such a solvent, the problem was laid before the Mellon Institute of Industrial Research, an endowed scientific institution, operated without profit. Here a formula was gradually perfected for a harmless, yet exceedingly effective, mucin solvent. It was called Mu-Sol-Dent.

Mu-Sol-Dent is a liquid, for *only a liquid can reach and clean the inaccessible spaces behind and between teeth.* Before being given to the public, it was submitted to the leading dentists for clinical tests. Soon a flood of letters came pouring in from these professional men, all testifying to amazing results obtained by this revolutionary new method of cleaning teeth. Over 5,000 such reports were received in a short time.

Mu-Sol-Dent not only is a great step forward in preventing decay, but also practically prevents tartar from forming. Tartar is the commonest cause of bleeding gums, pus pockets, pyorrhea, loss of teeth and health. Dentists found Mu-Sol-Dent very healing for sore gums and after tooth extraction. Physicians value it as a gentle, efficient solvent for mucus in nose and throat.

Mu-Sol-Dent is so pleasant to use that even children like it. It entirely does away with the messy old way of cleaning teeth, doing the work of paste and mouthwash combined in a safer, more effective way.

**Mu-Sol-Dent**

*At all leading drug stores. Get a bottle today or use coupon for sample.*

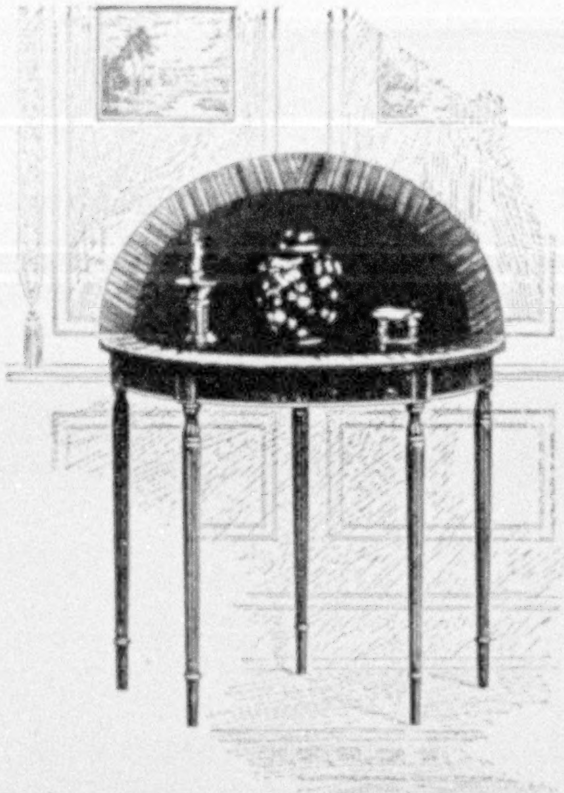
*Send with 10c for Mailing*

The V. B. Corporation Dept. IV.
916-N Forbes St., Pittsburgh, Pa.

Please send Sample Bottle of Mu-Sol-Dent to

Name……………………………………

Address……………………………………

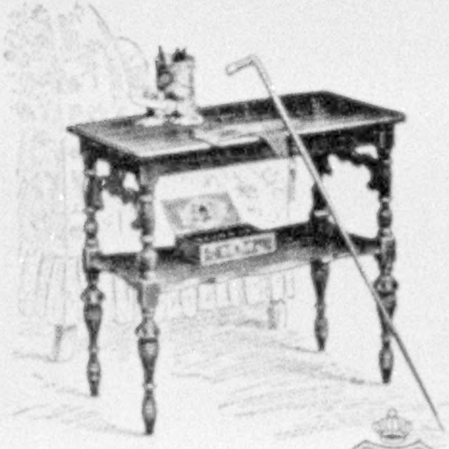


# Clever new furniture—

*you'll want to see*

Now in the stores you will find all the lovely new things for the living room that Imperial has designed for spring. Smart creations, totally different—stunning hand decorations in fashion's latest colors—precious woods of rare figure from the ends of the earth. They will bring to your home that envied touch of originality so much desired. Look always for the famous Imperial green shield trademark, your unfailing guide to late design and good value.

IMPERIAL FURNITURE COMPANY
*"World's Greatest Table Makers"*
GRAND RAPIDS, MICHIGAN



*Write Dept. G if you would like a free copy of a fine book on the decorative uses of tables, entitled "Heirlooms of Tomorrow."*

Imperial Tables
Grand Rapids

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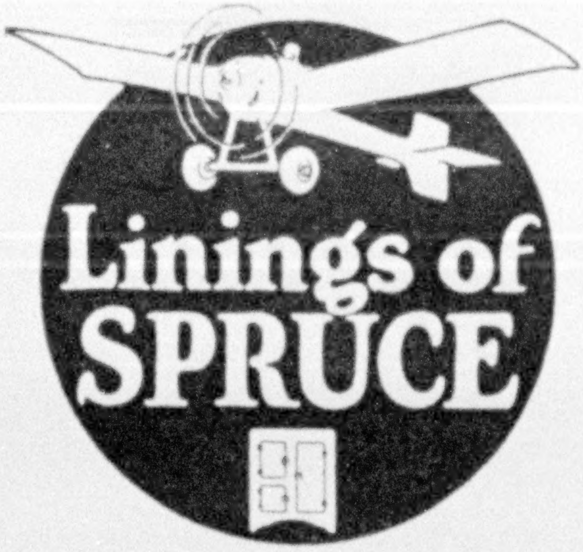


# Linings of SPRUCE

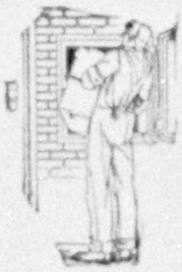
STRONG and enduring, spruce is the choice of Uncle Sam for our powerful army airplanes. Sweet and odorless, spruce is selected by butter makers to store their delicate and perishable product. The *Herrick* combines these and other advantages by using *spruce* as a *lining.*

Spruce is a non-conductor of heat and cold. It cannot rust. It resists moisture and taint. Spruce linings in the *Herrick* help to keep foods fresh and sweet. Other aids are *Herrick* cold, dry air circulation, mineral wool insulation and solid oak construction.

***Send for Free Booklet, "How the Herrick Pays for itself"***

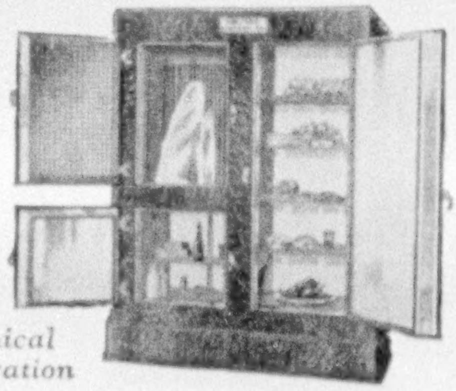
HERRICK REFRIGERATOR COMPANY
205 River Street, Waterloo, Iowa

*Food keeps* BEST *in the*
# HERRICK
**THE ARISTOCRAT OF REFRIGERATORS**

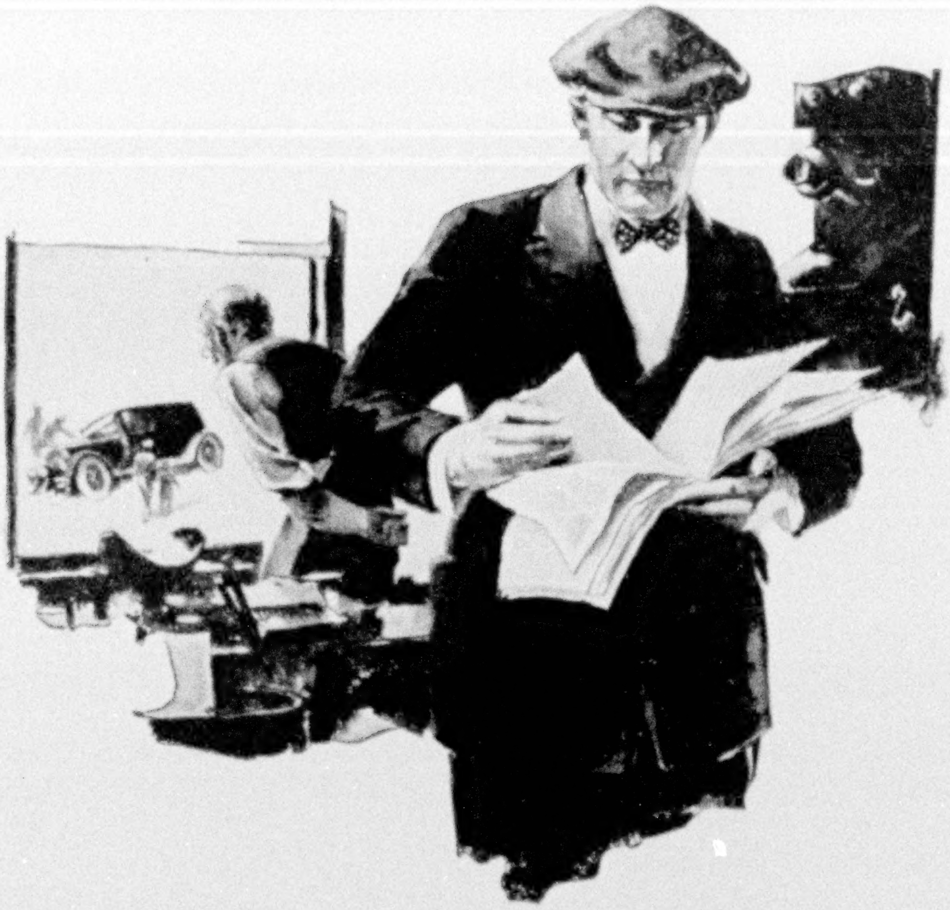


**Outside Icing**

makes botherless icing in summer and iceless refrigeration in cool weather. Ice delivered through door in back or side of *Herrick*.



*For Ice or Mechanical Refrigeration*



# "A thousand miles from home and in trouble!"

*Forced into the curb by a careless driver . . a pedestrian seriously injured . . wrecked car . . prompt assistance necessary . . perhaps the trip curtailed or spoiled. . . Not when the car is covered by an Ætna policy! Wherever you go, you'll find an Ætna-izer to help you in time of trouble and speed you on your way.*

TODAY, tomorrow, any time, *you* may be the victim of a reckless or incompetent driver. Protect yourself with an Ætna policy! Wherever you happen to be when the accident occurs—in Maine or California—you'll find an Ætna representative to straighten out your difficulties, to send you on your way with the cheerful assurance that repair expense will be taken care of. An identification card introducing you to 20,000 Ætna representatives is issued to every Ætna-ized motorist.

Protect yourself with an Ætna policy! Accidents happen at home as well as on the road. What would one do to *your* savings? Suppose you should injure some unseeing pedestrian. Juries these days award damages in thousands where once they dealt in hundreds!

Under an Ætna combination policy you can be protected fully against every insurable hazard. If your car injures someone—if it is stolen—if it burns—if it is damaged by collision or wrecks other's property—you can be secured against loss.

See the Ætna-izer in your community today! He is a man worth knowing. He represents the strongest multiple-line insurance organization in the world—the Ætna Life Insurance Company and affiliated companies.

For 75 years the name Ætna has symbolized the prompt payment *in full* of all just claims. It is a guarantee of worthy insurance honestly sold.

Today the great Ætna organization offers you unsurpassed protection in many forms—Life Insurance in all its branches, Accident and Health, Automobile, Liability, Compensation, Burglary, Fire and Marine, Fidelity and Surety Bonds—policies that protect your home, your family, your business, your estate.

Make the Ætna-izer your insurance adviser. His advice may save you thousands of dollars. Ætna-ize! According to your needs! As you prosper and as your obligations increase!

**ÆTNA-IZE**

ÆTNA LIFE INSURANCE COMPANY AND AFFILIATED COMPANIES

*Ætna Casualty and Surety Co. Standard Fire Insurance Co. Automobile Insurance Co., of Hartford, Conn.*

The Easiest Cleaning Imaginable

Royal feels light as a feather in your hand—even a little child can guide it and do thorough cleaning.

Such marvelous ease of operation is due to Royal design—large, smooth-running wheels, light weight, wonderful "balance," comfortable handle grip, convenient switch right at your finger tips.

To use the Royal you simply guide it—its results are so wonderfully thorough and rapid that it banishes forever your cleaning worries.

Until you have tried a Royal in your own home you cannot realize how much time and labor it really will save you.

There is a dealer near you who will gladly lend you a Royal to try. If you don't know his name, write us.

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Manufactured in Canada for Canadians by Continental Electric Co., Ltd., Toronto.
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ROYAL
ELECTRIC CLEANER
*Gets ALL the dirt by Air Alone*

Emblem of Business Character
Rice Leaders of the World Association

*Look Inside the Piano for this Trade Mark*

WESSELL, NICKEL & GROSS
NEW YORK
TRADE MARK

*The Sign of the World's Standard Piano Action*

The Right Start in Music Practice

ACQUIRING *correct touch* is the first essential in your child's music practice. As touch is transmitted to string by the *piano action*, it is essential that little fingers be given the early advantage of a perfectly balanced and delicately responsive action.

Choose for your child a piano equipped with the Wessell, Nickel & Gross piano action. Then will daily music practice begin with a piano action developed to the very borderland of perfection. You will be assured of a quality piano, too, for this famous action is found only in worthy instruments.

The Wessell, Nickel & Gross action is the *world's highest-priced piano action*—used since 1874 by leading American piano manufacturers—built by the oldest, largest and leading makers of high-grade piano actions.

WESSELL, NICKEL & GROSS
Established 1874 New York

*When you Buy an Upright, Grand, Player or Reproducing Piano—Insist on the Wessell, Nickel & Gross Piano Action.*

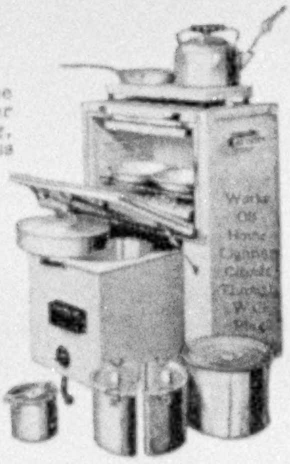
CAMPBELL'S AUTOMATIC "RAPID"
ELECTRIC FIRELESS
COOKER RANGE

Exactly what you've been waiting for—the new "Rapid"—an electric fireless cooker range with double electric grill for frying, 18 in. oven for baking, large electric fireless cooker for boiling. Automatic heat regulator in oven turns current off and on as needed. Maintains a steady, constant temperature. Never too hot—never too cool. Better roasts, better baked pies and cakes. *No special three-wire wiring required.*

Special 30 Day Trial Offer

Write for FREE home science cook book. Cash or easy payments. Low price will amaze you. A card will do

WILLIAM CAMPBELL CO., 1016 Union Av.
Alliance, Ohio Georgetown, Ontario



I want to send you my Gladiolus Book

I WILL send you my 1926 Gladiolus Book on request. It lists many new Kunderd originations, is profusely illustrated in colors and contains my full cultural directions. Write for it now so you can make an early selection.

A. E. KUNDERD
161 Lincoln Way West,
Goshen, Ind., U. S. A.
*The Originator of the Ruffled and the Laciniated Gladioli*

Kunderd *Gladioli*
*Stand Supreme*

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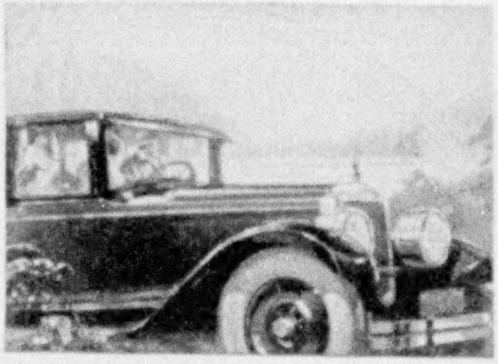


*Through shine and shadow . . . the beauty of DUCO endures*

Drive where and when you will . . . over mud-whipped, rain-splashed roads . . . the luxurious beauty of Duco smiles at exposure, and defies the elements.

Your new car may bring you the enduring beauty of Duco . . . you will find it used on the most desirable motor cars of the year.

Or your old car may be made beautiful with it . . . for there is a Duco Refinishing Station conveniently near you.

*New or old... your car deserves DUCO*

DU PONT
**DUCO**
REG. U.S. PAT. OFF.

DUCO should not be confounded with any other finish . . . It was created by du Pont Chemical Engineers, and was made possible only because of the century-old experience of the du Pont organization.

Unlike other finishes, Duco does not "break down" under the most extraordinary usage.

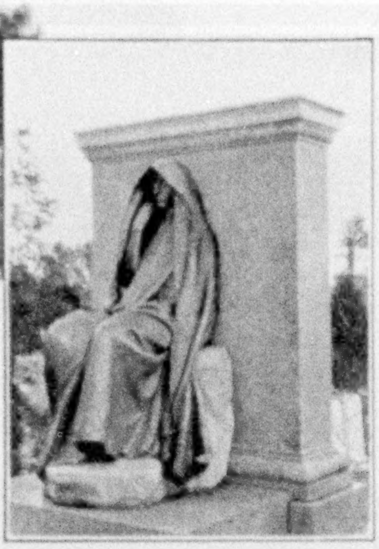
The punishment of daily driving in all weathers ...heat, cold, oils, mud, salt air, alkali dust... even hasty cleaning . . . Duco's rich lustre withstands all these.

A little Duco Polish No. 7 is all that is needed to wipe away Traffic Film, and reveal the enduring beauty of Duco.

E. I. du Pont de Nemours & Co., Inc., Chemical Products Division, Parlin, N. J., Detroit, Mich., Chicago, Ill., San Francisco, Cal., Everett, Mass., or Flint Paint & Varnish Limited, Toronto, Canada.

*There is only ONE Duco — DU PONT Duco*

Alfred T. Ringling Mausoleum, Kensico, N.Y.
Egyptian Architecture, executed in Milford Pink Granite



The Adams Memorial
Milford Pink Granite
ROCK CREEK CEMETERY, WASHINGTON, D. C.
A MASTERPIECE BY AUGUSTUS ST. GAUDENS

It may be in the pedestal that supports the masterpiece of a great sculptor's genius or in the quiet strength and beauty of the private mausoleum that a Dodds product finds its usefulness. The countless examples of fine craftsmanship and the perpetual beauty of the granites make Dodds service paramount in the realm of memorial art.

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Annual membership in U. S., $3.00; annual membership abroad, $4.00; Canada, $3.50; life membership, $100. Please make remittances payable to the National Geographic Society, and if at a distance remit by New York draft, postal or express order.

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*The Membership Fee, Which is for the Calendar Year, Includes Subscription to the National Geographic Magazine. New Members Receive Their Twelve Numbers of The Magazine Beginning with January*

PLEASE DETACH AND FILL IN BLANK BELOW AND SEND TO THE SECRETARY

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*To the Secretary, National Geographic Society,*
*Sixteenth and M Streets Northwest, Washington, D. C.:*

*I nominate* ...............................

*Occupation* ...............................
(This information is important for the records.)

*Address* ...............................

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*for membership in the Society.*

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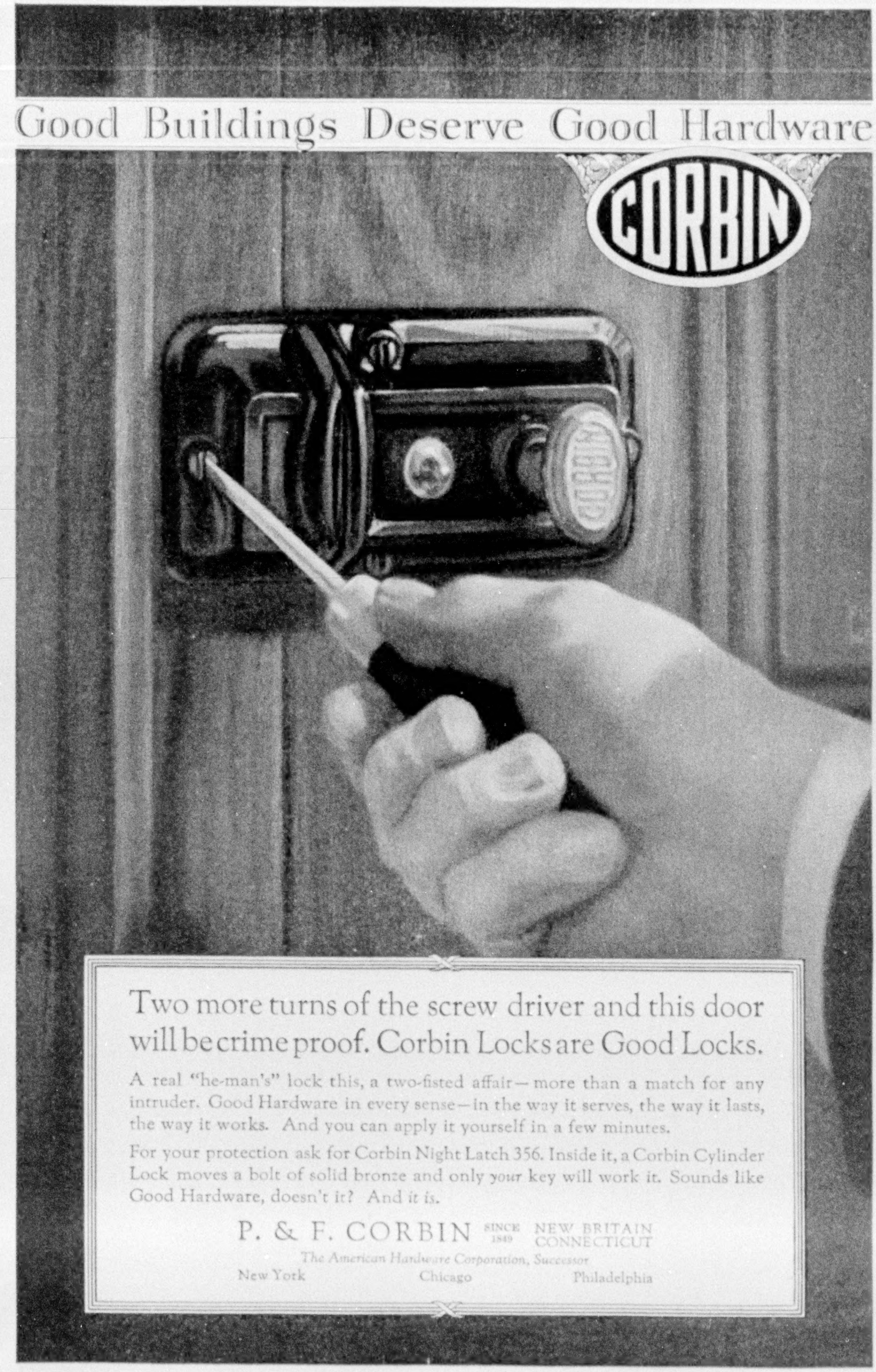
...............................
*Name and Address of Nominating Member*

4-26



Good Buildings Deserve Good Hardware

CORBIN

Two more turns of the screw driver and this door will be crime proof. Corbin Locks are Good Locks.

A real "he-man's" lock this, a two-fisted affair—more than a match for any intruder. Good Hardware in every sense—in the way it serves, the way it lasts, the way it works. And you can apply it yourself in a few minutes.

For your protection ask for Corbin Night Latch 356. Inside it, a Corbin Cylinder Lock moves a bolt of solid bronze and only *your* key will work it. Sounds like Good Hardware, doesn't it? And *it is*.

P. & F. CORBIN SINCE 1849 NEW BRITAIN CONNECTICUT

*The American Hardware Corporation, Successor*

New York Chicago Philadelphia

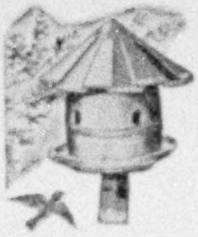
DODSON
Bird
Houses
Lure the
Songbirds

## A Beautiful Garden and Lovely Flowers but---without the birds and birdlings half the pleasure is missing

Birds abide where they feel protection and know they can obtain food and drink without danger of being molested. Under such conditions they raise family after family, singing and working the whole day long, ridding the garden and trees of the injurious moths, weevils, worms, ants and mites that destroy your beautiful trees, shrubs and flowers. Invariably a Dodson house placed as directed will get these beautiful birds. The sweet-singing wren, bluebirds and flickers take naturally to Dodson's scientifically made houses. The beautiful cardinals, thrushes and dozens of other songbirds will seek your garden if the kind of shelter and food they like is provided. *Once you know the joy of bird friendship, you will regret the years of pleasure missed.*

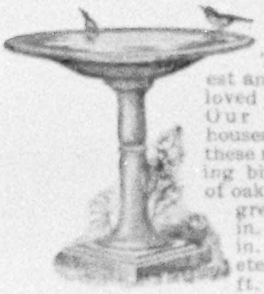
WHY DODSON HOUSES WIN THE BIRDS

Mr. Dodson has for many years devoted his entire time to lecturing, visiting beautiful estates in the study of wild birds all over America. Many seemingly insignificant details have been discovered and patented by him that are vital in the luring of songbirds to man-made houses. Mr. Dodson is always willing to talk before clubs or associations interested in creating bird sanctuaries, either private or municipal.



Bluebird House

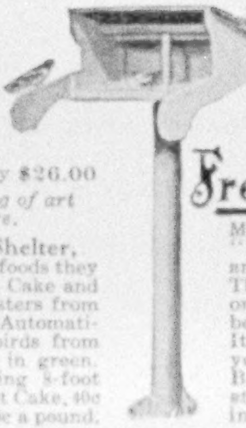
The happiest and most beloved songsters. Our scientific houses satisfy these most exacting birds. Made of oak, finished in green. Size, 21 in. high by 16 in. in diameter, with 18-ft. easy raising pole. Price, $14.00.



BIRD BATH

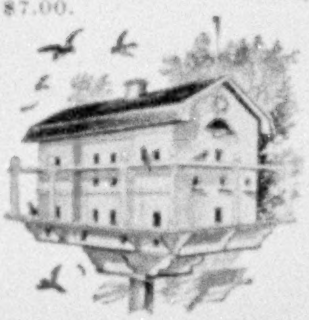
This handsome stoneware bath is an ornament for any garden, being very graceful and substantial. The birds bathe freely in it, as they do not fear the cats. Complete with 32-in. stand, only $26.00

*Write for our big catalog of art stoneware furniture.*



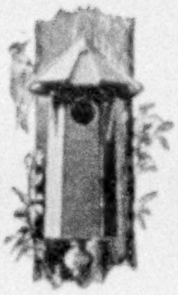
**Automatic Feeding Shelter,** stocked with a few simple foods they crave and DODSON'S Suet Cake and Grain Mixture, lures songsters from the whole neighborhood. Automatically revolves to protect birds from storms. Cypress, finished in green. Size, 24x22x12 in., including 8-foot pole, $8.50. Dodson's Suet Cake, 40c a pound; Grain Mixtures, 10c a pound.

Dodson's Scientific Wren House as shown above. The Silver-throated Wren is one of our sweetest singers. A four-compartment house satisfies their habit of changing nests for each of their three broods. Beautiful design, made of oak, finished in green, with cypress shingles, copper coping, comes complete with rust-proof snap on hanger. Size, 28 in. high by 18 in. in diameter. Price, $7.00.



QUEEN ANNE MARTIN HOUSE

48 rooms for the beautiful Martins, who colonize. Scientific porch, pure white, green trim. Cypress, copper roof, including 22-foot easy raising pole. House, 36x26x37 inches. Price, $60.00. Others as low as $18.00.



FLICKER HOUSE

Lures the Flickers. They keep your trees free of destroying moths, ants and other tree pests. 26½ in. high by 12 in., only $7.00.

**Free**

My fascinating book, "Your Bird Friends and How to Win Them," sent to anyone who loves our beautiful songbirds. It is full of things you should know. Based on 40 years' study of this most interesting subject.

Ask about Dodson's Guaranteed Sparrow Trap.

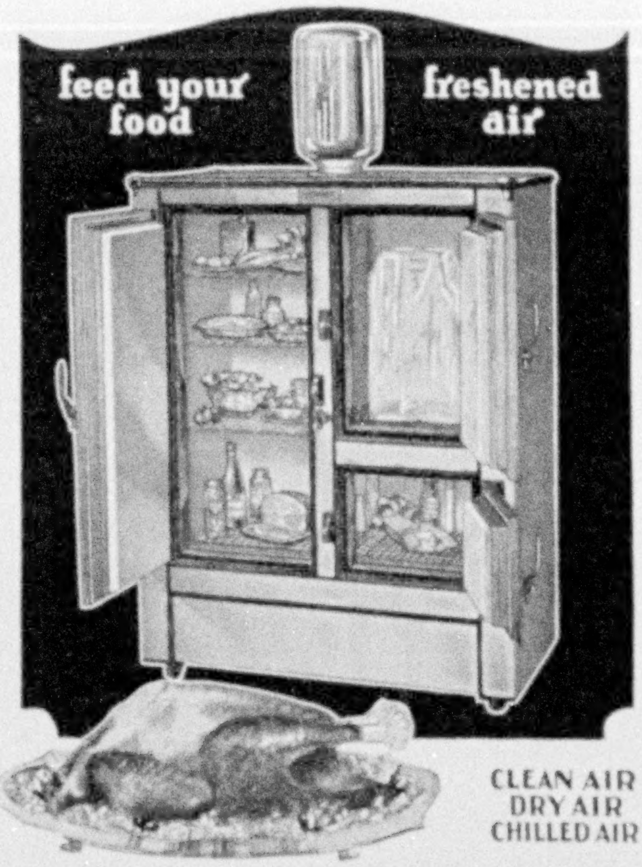
*Order direct from this ad.* DODSON *Scientifically Designed Houses can only be bought from*

**JOSEPH H. DODSON, Inc.**

President of the American Audubon Association

740 Harrison Avenue Kankakee, Ill.

# DE LUXE ALL PORCELAIN AUTOMATIC REFRIGERATORS



## *Your 52 Roasts—Keep Them Savory*

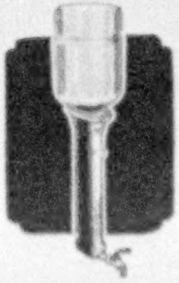
TENDER, JUICY ROASTS! Save their richness of flavor in the clean, icy chambers of the Automatic. Frosty drafts of pure, sweet air protect the tastiness and tenderness of your most expensive food, the meat. Everything keeps daintily fresh and inviting in this wholesome, ever-changing atmosphere.

Convenience and cleanliness are built into this beautiful De Luxe Automatic, with its glistening porcelain exterior and one-piece porcelain lining. You'll have loads of room for everything without crowding in the oversize food chambers fitted with non-rustable shelves. The rounded corners eliminate all joints and crevices.

Your lowered ice bills will prove the splendid economy of the Automatic. 16 walls of insulation make your ice last longer. Golden ash or Super-Steel casings, if desired. All models are perfectly adaptable to electric refrigeration.

*Write for your dealer's name. Just send us your address. We want you to have our new folder describing the latest Automatic Refrigerators.*

ILLINOIS REFRIGERATOR COMPANY
Dept. 15 A, Morrison, Ill.



*Pure, Chilled Drinking Water —always ready*

*Convenient and Sanitary. Ice does double duty*

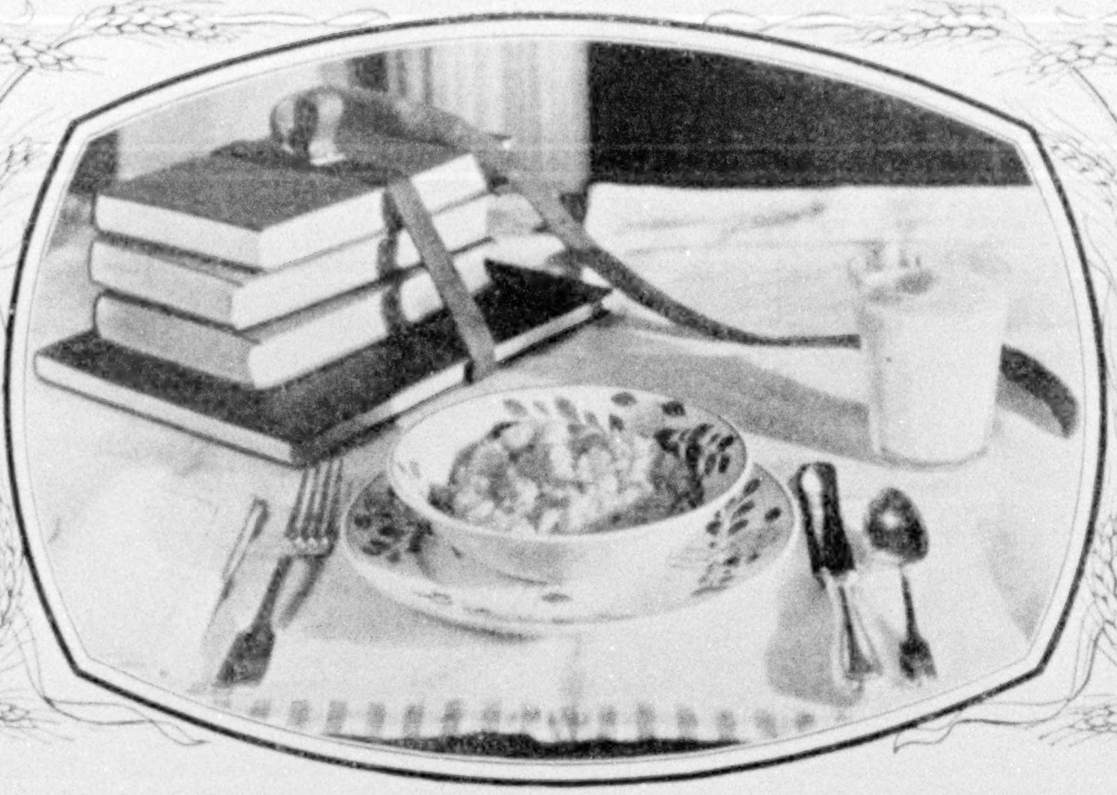
**ALSO CHILL YOUR DRINKING WATER**

*De Luxe All Porcelain*

**AUTOMATIC**

saves food chills water

MORRISON ILLINOIS



*Either at Breakfast or Supper Growing Children Need*

# The New Pettijohn's

**WHOLE WHEAT CEREAL**

THE New Pettijohn's is the *whole wheat*—the finest hard Montana wheat, milled by an exclusive process.

It has all the natural bran of the wheat—a safe and efficient laxative.

It has the health-giving vitamins of the wheat.

And the valuable mineral salts, protein and energy.

The New Pettijohn's is delicious—a nourishing, stimulating food that all the family will enjoy.

It cooks in 3 to 5 minutes—ready for the table—hot and appetizing.

Try it tomorrow.

THE NEW
PETTIJOHNS
COOKS IN 3 TO 5 MINUTES

*In brief*

*The* New Pettijohn's is a deliciously palatable whole wheat food.

It contains all the Vitamins, Energy Content and Mineral Salts of the Wheat Berry and all the Natural Bran.

With milk it forms one of the best balanced food combinations known to dietitians. It cooks in 3 to 5 minutes.

**The Quaker Oats Company**

CHICAGO, U.S.A.

# A Garden Full of Gladioli

The Gladiolus is one of the most satisfactory flowers grown—it is as easy to grow as the potato. Every family can enjoy this grand flower. They bloom from July to frost if you plant a few bulbs each month from April to July.

### Special $2.00 Offer

For Two Dollars we will send 50 Bulbs of our Grand Prize Mixture, which covers every conceivable shade in the Gladiolus kingdom.

### Special $6.00 Offer

100 Choice Named Varieties (*Catalog Price, $9.00*)

For those who plan their garden according to a color scheme, we offer 10 Bulbs each of the following 10 choice varieties:

**Evelyn Kirtland**, *Rosy Pink*; **Flora**, *Finest chrome-yellow*; **Le Marechal Foch**, *Fine salmon-pink*; **Mrs. Frances King**, *Vermilion*; **Mrs. Frank Pendleton**, *Deep salmon*; **Orange Glory**, *Rosy orange*; **Panama**, *Rose-pink*; **Peace**, *Splendid white*; **Schwaben**, *Finest canary-yellow*; **War**, *Deep ox-blood red*.

Order Your Bulbs Now, so as to have them to plant when you begin making your garden.

*Simple cultural directions in each package*

Mention this advertisement and send Check, Money Order, Cash or Stamps, and secure either one, or both, of these splendid collections, sent prepaid to any point in the U. S. east of the Mississippi. For points West and Canada add 25c for the $2.00 collection or 50c for the $6.00 collection.

*Our 1926 Spring Seed Annual sent on request*

**Stumpp & Walter Co**

30 and 32 Barclay Street New York

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# McDonnell Memorials

Erected for U. S. Senator Oscar W. Underwood, Birmingham, Ala.

Outstanding features of McDonnell service are—beauty in design and the capacity for taking infinite pains in the making of your family memorial stone.

A beautifully illustrated one-hundred-page booklet, undoubtedly the finest ever published, will be gladly sent free at your request.

**McDONNELL & SONS, Inc.**

Established 1857

**Designing Department**
**Buffalo, N. Y., 858-860 Main St.**

**Quarries and Works**
**Barre, Vermont**

*National Makers of Memorials for Three Generations*

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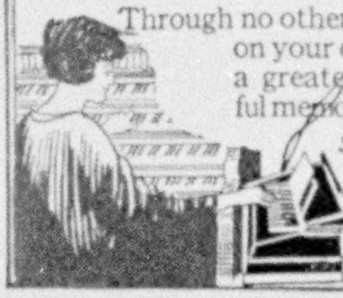
Memories of a loved one are most fittingly symbolized in the sweetly musical tones of

## *Deagan Tower Chimes*

***Played by Organist from Electric Keyboard***

### *The Memorial Sublime*



Through no other means can you confer on your church and community a greater beneficence. Beautiful memorial booklet on request.

*Standard Sets $6000 and up*

**J. C. DEAGAN, Inc.**
**250 Deagan Bldg.**
**CHICAGO, ILL.**

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# Clark's Famous Cruises

BY CUNARD LINE BIG NEW OIL-BURNERS

## NORWAY AND WESTERN MEDITERRANEAN

**53 DAYS, $550 to $1250**

**ss "LANCASTRIA" JUNE 30**

Includes Lisbon, Spain, Tangier, Algiers, Italy, Riviera, Sweden, Norway Fjords, Scotland, Berlin (Paris, London), repeating last summer's greatest cruise success.

Rates include hotels, drives, guides, fees.

Books now open for 1927 cruises: Jan. 19 Round the World 7th Cruise, $1250 to $2900; Jan. 29 Mediterranean 23d Cruise, $600 to $1700; Feb. 5 new South America and Mediterranean Cruise, $800 to $2300.

*Please specify program desired.*

**FRANK C. CLARK, Times Bldg., N. Y.**

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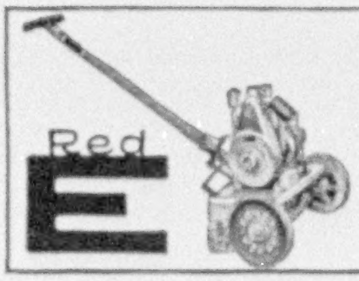

**Red E**

## Red-E Power Lawn Mower

A STURDY, compact, clean-cutting, self-sharpening mower that *propels itself*. With this mower a 16-year-old boy can cut practically as much grass in a day as two men with hand-pushed mowers. All units are of highest quality. Write for descriptive literature.

Red-E Mfg. Co., 343 Davidson St.
Milwaukee, Wis.

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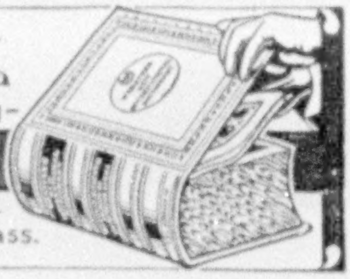
*Whatever Your Question*;—be it the pronunciation of **Fascista**, the spelling of a puzzling word, the location of **Esthonia** the meaning of **soviet, realtor, vitamin**, etc., this **Supreme Authority**—

## WEBSTER'S NEW INTERNATIONAL DICTIONARY



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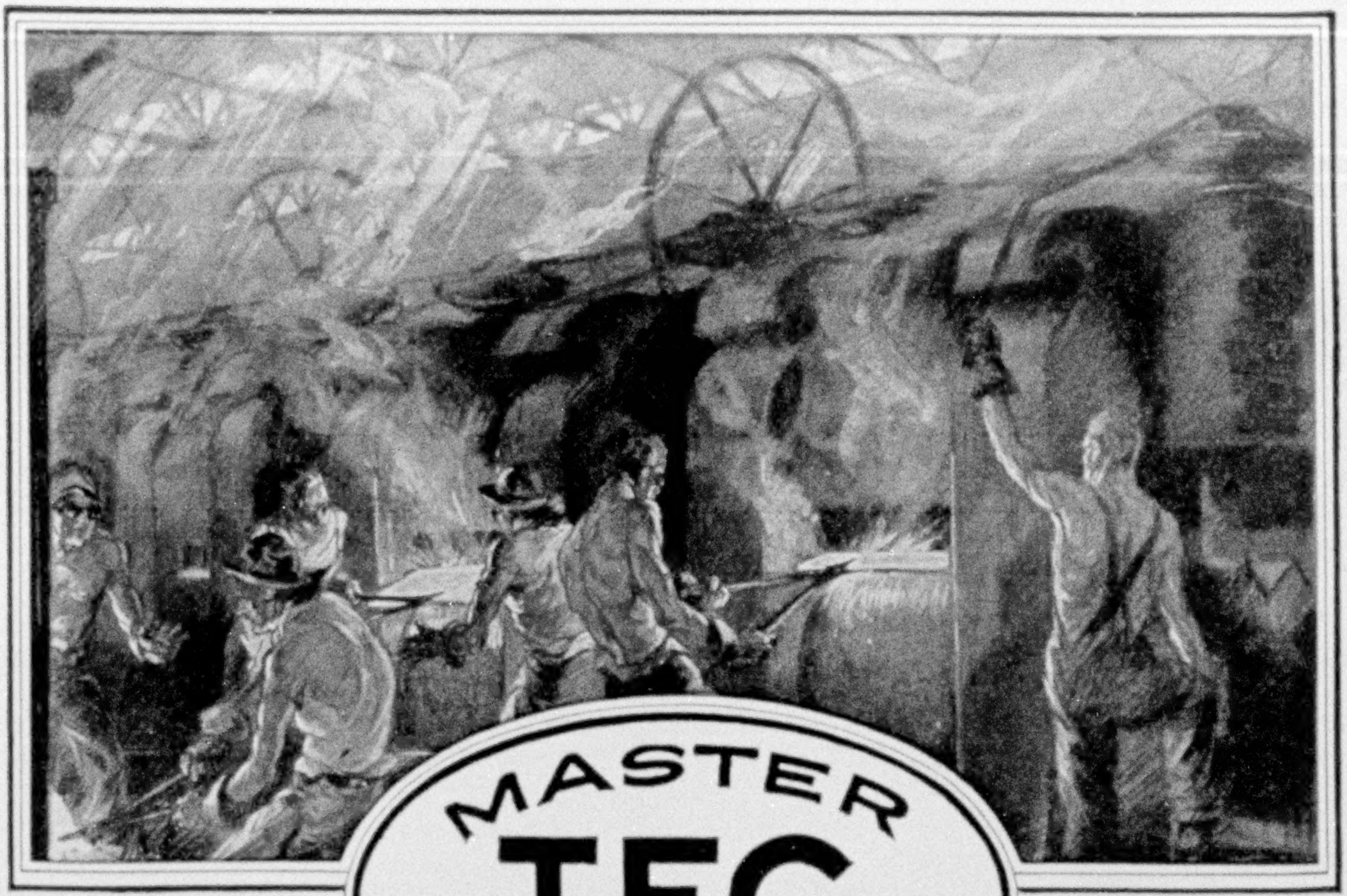

MASTER
**TEC**
BRAND
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*The Master Brand on Sheet Steel is a certificate of quality.*

# *Now you can buy* SHEET STEEL with complete assurance of uniform quality

THE Master Brand appearing on Sheet Steel certifies that the material so stamped has been made to the MASTER BRAND quality standards. The Master Brand has been adopted by the Sheet Steel Trade Extension Committee after two years' study of a means to insure consistent quality. It assures to the public and to the fabricator of Sheet Steel products, dependable quality and service; it protects the manufacturer who provides a product having a recognized definite quality.

The Master Brand is your evidence that the Sheet Steel you buy is of this standard quality. The Brand can be applied only by mills who have been licensed to use it and whose product is subject to regular inspection. It represents the quality standard of the Sheet Steel Trade Extension Committee . . . and this Committee assures you the standard will be maintained.

For roofing any kind of structure from bungalow to skyscraper—for cornices—for the siding of warehouses, factory buildings, and for many interior uses in construction, equipment and furnishings, Sheet Steel is a superior and economical material.

For the different uses to which it is to be put, Sheet Steel is made in a wide variety of thicknesses and weights (gauges). When used in any manner in which it is exposed to the action of the weather, as in roofing, Sheet Steel should be of sufficiently heavy gauge (never less than 28 gauge), and thoroughly galvanized to insure durability.

In every branch of production and commerce—in the automotive field, in the electrical industry, in railroad service, on the farms of America, in office, factory and home, Sheet Steel which bears the Master Brand can be depended upon to give economical and lasting service. A booklet, "Sheet Steel Service to the Public," mailed on request.

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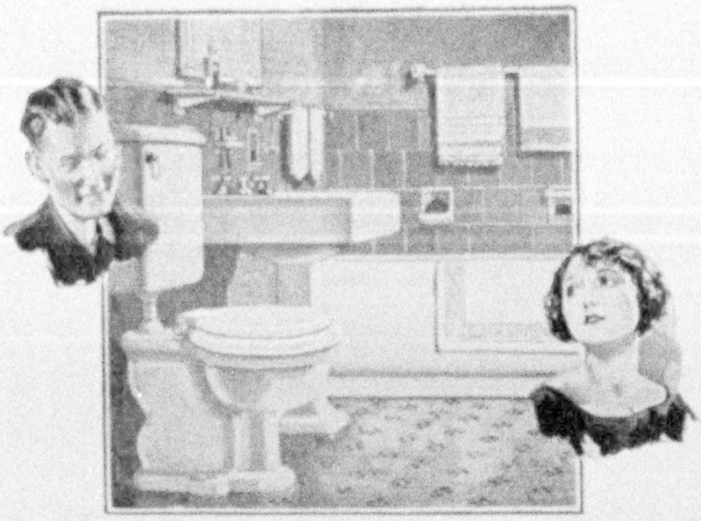
**TRADE EXTENSION COMMITTEE**
OLIVER BUILDING
**PITTSBURGH PENNSYLVANIA**



"Jim, I wish we had *a better looking bathroom*"

"JIM," said Mrs. Williams one morning, "now that you are getting ahead so splendidly in business and bringing home important new friends to be entertained, I wish we had a better-looking bathroom. Guests notice things so. I wish I could find some easy, inexpensive way to make our bathroom look better. It's my greatest problem."

"You'll solve it," Jim told her. And as a matter of fact, she did. In the simplest possible way. Simply by replacing the old, dark-colored toilet seat with a handsome, modern, all-white "Church" Toilet Seat.

The improvement which this made in the appearance of the bathroom was quite astonishing. Its beauty and refinement are qualities which every woman wants in her bathroom, a room she can be proud to have guests use.

The Church Seat stays permanently white. Its handsome ivory-like surface won't crack, splinter, chip, wear off or stain. It washes as easily as porcelain. You can install it on any toilet in a few minutes. Obtainable at any plumber's.

*Are you proud to have guests go into your bathroom?*

If you have sometimes wished that your bathroom looked a little more attractive and up-to-date, send for a free copy of our book which tells how one woman discovered how to make her bathroom a room she could be proud to have guests use. It will help you. Use coupon. Address: C. F. Church Mfg. Co., Dept. R-2, Holyoke, Mass.

Church sani-white Seats

LOOK FOR THIS NAME ON UNDER-SIDE OF SEAT

C. F. CHURCH MFG. CO.,
Dept. R-2, Holyoke, Mass.:

With no obligation on my part, please send a free copy of your book, "An Easy Way to Make a Bathroom More Attractive," together with a free sample of Sani-white sheathing to:

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Street ..............................

City .............................. State ..............

*Safeguard where you cannot see*

SANI-FLUSH eliminates all the labor from the task of cleaning the toilet bowl. It cleans more thoroughly than scrubbing and scouring.

Sani-Flush purifies the trap which you cannot see or reach, removes sediment and banishes foul odors.

Sprinkle Sani-Flush into the bowl, follow the directions on the can, and flush. Marks, stains, incrustations vanish. The bowl is clean, white, sanitary. Sani-Flush cannot harm plumbing. Always keep a can handy in the bathroom.

*Buy Sani-Flush at your grocery, drug or hardware store, or send 25c for a full-size can. 30c in Far West. 35c in Canada.*

**Sani-Flush**

Reg. U.S. Pat. Off.

Cleans Closet Bowls Without Scouring

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Canton, Ohio

**Quality in a small Power Mower**

A worthy member of the famous Jacobsen line, which includes a power mower for every type of lawn. The "Junior" mower cuts a 19-inch swath at the rate of two acres a day on a gallon of gas. Suitable for moderately large lawns. Efficient on terraces—steers easier than a hand mower. Has self-sharpening device. Fully guaranteed—attractively priced. Write for literature today.

**Jacobsen Mfg. Co.**
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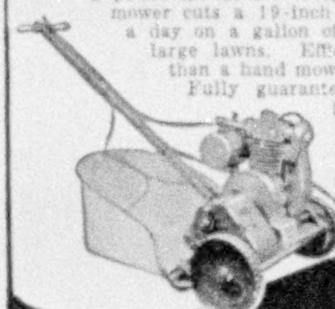

**Jacobsen "Junior" Power Lawn Mower**

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ECKINGTON PLACE AND FLORIDA AVE.
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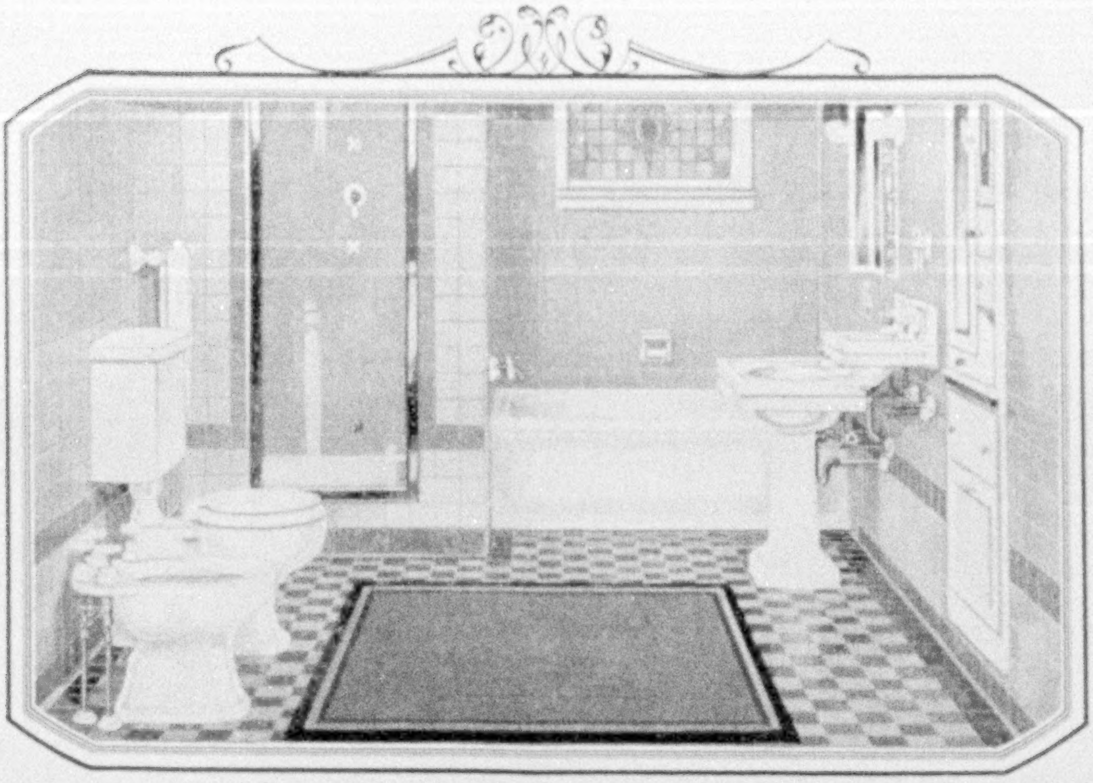


# TE-PE-CO

ALL-CLAY PLUMBING FIXTURES

TEPECO

*The Sign of One Quality*

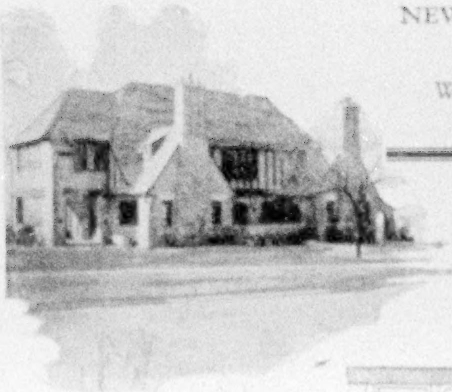
FROM the sanitary standpoint, Te-pe-co, embodying as it does the utmost in achievement of sanitary engineering, leaves nothing to be desired.

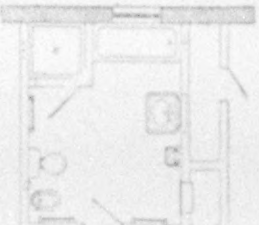
Te-pe-co Plumbing Fixtures are china and porcelain—most sanitary, beautiful, practical and permanent. Our acknowledged leadership in this industry has been made possible by untiring effort to produce plumbing fixtures of the finest quality and market them at a moderate price. No better ware can be made—seldom is it equaled. Te-pe-co is the accepted standard of excellence for public buildings and private residences.

There is a wide range of Te-pe-co prices owing to the variety of sizes and designs.

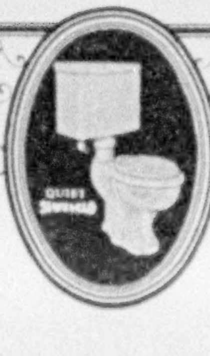
The Trenton Potteries Co.
TRENTON, N. J., U.S.A.
NEW YORK PHILADELPHIA BOSTON
SAN FRANCISCO

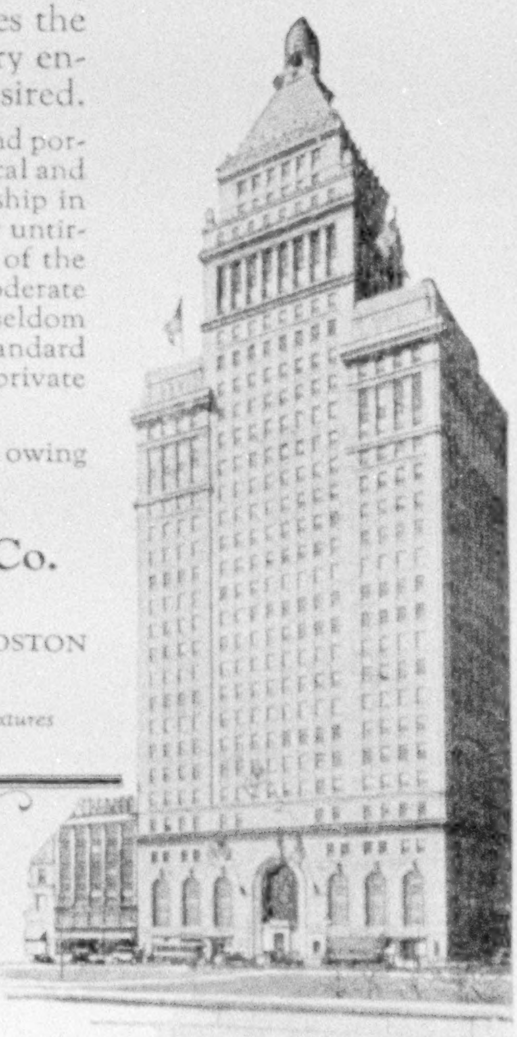
*World's Largest Makers of All-Clay Plumbing Fixtures*





Your bathroom owes much of its beauty and convenience to correct utilization of floor space. Our book, T-4 "Bathrooms of Character," shows a number of model floor plans. Send 10 cents for your copy.





"Te-pe-co" Plumbing Fixtures are included in the equipment of the Strauss Office Building, Chicago, Ill.
Graham, Anderson, Probst & White, Architects.
Wolff Mfg. Corp., Plumbing Supplies.
Hanley & Co., Plumbing Contractors.

*It's New!*

The Electric Lawn Mower

The Coldwell Electric Lawn Mower mows as it goes. Self-propelled — as easy to operate as a vacuum cleaner. All the operator has to do is steer it. Plugs in on any garage or house light socket — either alternating or direct current and uses about the same amount of current as an electric iron. 150 feet of cable (allowing a 300 ft. cutting radius) is carried on an automatic reel which takes up and pays out the wire automatically as needed, thus keeping it tight and out of the way of the machine and operator.

Mower by Coldwell—cuts a 21-inch swath — ½ H. P. Universal Motor by General Electric — Timken Tapered Roller Bearings. Thoroughly dependable, practical and economical. Send for booklet.

SINCE 1867

**COLDWELL**

*Dependable* Lawn Mowers

*Hand · Horse · Gasoline · Electric*

COLDWELL LAWN MOWER CO.
NEWBURGH, N. Y.

*Of Course You Can Go to*

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Fine inexpensive tours piloted by an old American firm.—59 to 85 days—June to Sept. Itineraries include 8 countries — $835 up

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Very economical—comprehensive—particularly attractive to young folks—$395 up

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America's Best Roses!

"The Star Guide to Good Roses" tells all about them. With it, you can choose easily and be assured of perfect blooms. It's interesting! It's new! 100 pages—18 roses pictured in natural colors. Write for your "Guide" *now*—it's FREE!

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*Hang Up Your Travel Photographs with*

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**Moore Push-less Hangers**

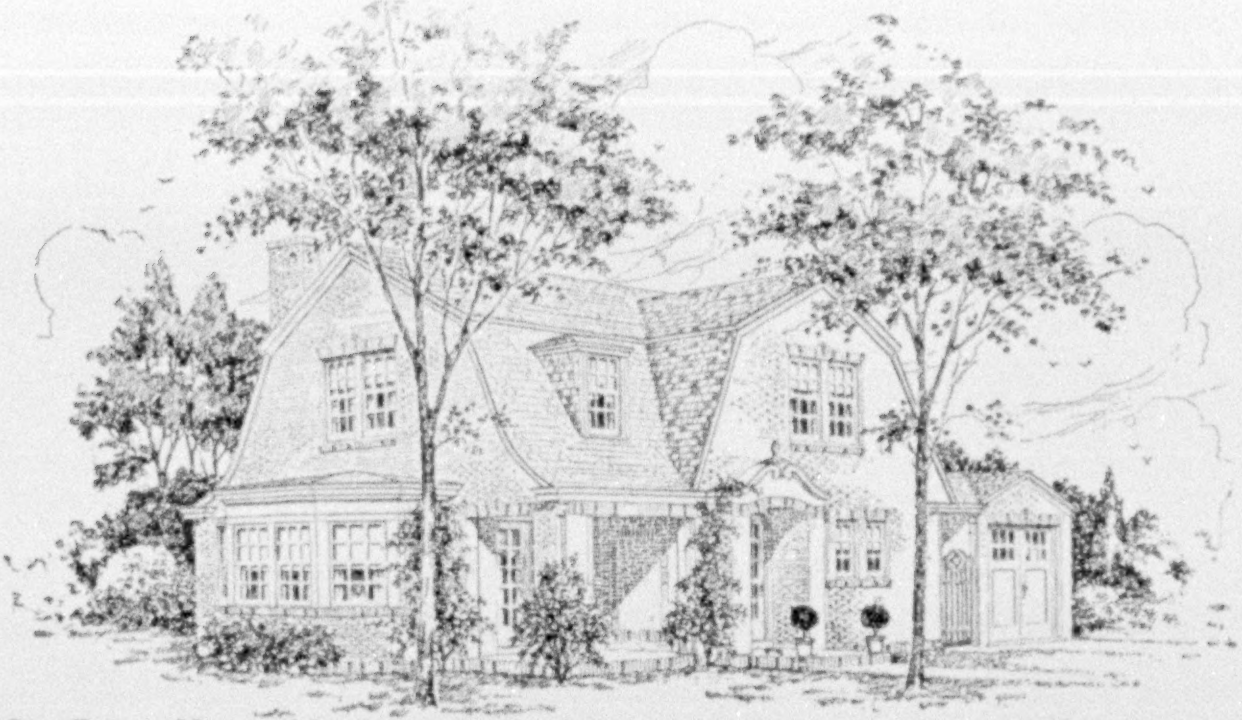
Scientifically Secure Safety

Tool-tempered steel points insure safety and will not injure plaster or woodwork

Samples of Colored Map Tacks for the asking

10c. Pkts. Everywhere

Moore Push-Pin Co., Philadelphia, Pa.



Six-Room House No. 633 *Designed for Service Department, American Face Brick Association*

*This is one of the 120 houses, embracing a wide variety of architectural styles and interior arrangements, shown in our "Face Brick Bungalow and Small House Plans."*

# The Economies of the Face Brick House

THE beauty and charm of the Face Brick house have always excited the admiration of home lovers. But it was not until the public learned about its many economies that Face Brick won its present popularity. Today most home-builders know that slow depreciation, a minimum of upkeep and repairs, painting only around doors and windows, low insurance rates and smaller fuel bills soon wipe out the slight additional cost of the Face Brick house and, in the long run, make it the most economical to own. The facts are fully presented in "The Story of Brick." Sent free.

## Send for these booklets:

*"The Story of Brick"* is an attractive booklet with beautiful illustrations of modern homes, and discusses such matters as Comparative Costs, Basic Requirements in Building, The Extravagance of Cheapness, and kindred subjects. Sent free.

*"Face Brick Bungalow and Small House Plans"* embrace 120 designs of Face Brick bungalows and small houses. These houses are unusual and distinctive in design, economical to build, and convenient in floor plan. Issued in four booklets, showing 3 to 4-room houses, 5-room houses, 6-room houses, and 7 to 8-room houses. The entire set for one dollar; any one of the books, 25 cents. We can supply complete working drawings at nominal prices.

*"The Home of Beauty"* contains 50 designs of two-story six-room Face Brick houses, representing a wide variety of architectural styles and interior arrangements, selected from 350 designs submitted in a nation-wide Architectural Competition. Sent for 50 cents. Complete working drawings for these houses at nominal cost.

*"The Home Fires,"* a most attractive fireplace book, with many designs, gives full directions for fireplace construction. Sent for 25 cents.

Address, American Face Brick Association, 1737 Peoples Life Building, Chicago, Illinois.

A Garden Full of Dahlias for $3.50

New and Rare Exhibition Dahlias

Few flowers, whether used for garden decoration or principally for cut blooms to decorate the home, are as responsive to simple garden culture as our Modern Dahlia. It has made wonderful advancement in size of bloom, habit of growth and profuse blooming qualities.

In order to further its now great popularity, we are offering this collection of

**12 Dahlia Tubers for $3.50**

—one each of 12 distinct varieties, not labeled, which if purchased separately according to name would cost not less than $10.

**Order Your Tubers Now** so as to have them ready to plant any time after the tenth of May or when all danger of frost is past.

Mention this advertisement and send check, money order, cash, or stamps, and secure this exceptional collection, sent prepaid to any point in the U. S.

*Our 1926 Spring Seed Annual sent on request.*

Stumpp & Walter Co

30 and 32 Barclay Street New York

His Wife Says He Acts Like a New Man

Just because he shaves with Barbasol. Saves time—saves temper—this new way to shave. No brush. No rub-in. Try Barbasol three times, according to directions. 35c and 65c tubes.

Antiseptic Beard Softener
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The Barbasol Co.
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I enclose 10c. Please mail trial tube.

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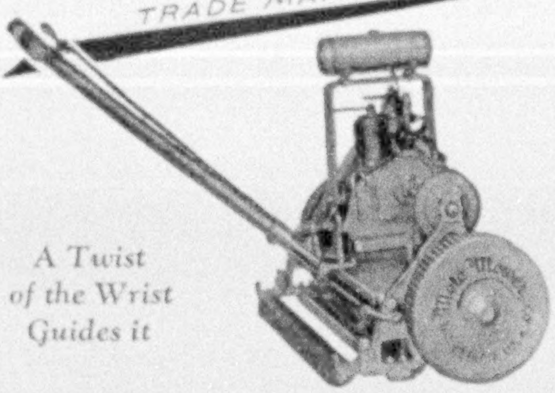
For Modern Shaving

Moto-Mower
TRADE MARK



*A Twist of the Wrist Guides it*

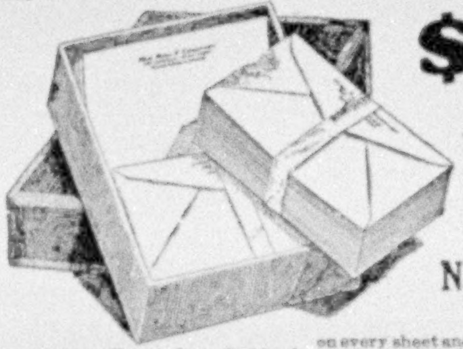
A Real Grass Cutter

The Moto-Mower will give you a nice clean job. It is fast, powerful, simple and "foolproof." Controlled by two handle-grips. A twist will start, stop or turn it in any direction—on its own power. Cuts close to trees and flower beds. Send for our latest catalog—today.

THE MOTO-MOWER COMPANY
3244 E. Woodbridge St. Detroit, Mich.

**200 Sheets—100 Envelopes**

**$1.00**
Post Paid



High grade, clear white bond paper—unusually smooth writing surface. Size 6x7 inches with envelopes to match. Has that crisp, crackly "feel" that identifies it to everyone as superior quality stationery.

Name and Address Printed Free

on every sheet and envelope in rich dark blue, up to 4 lines. Type is Plate Gothic, designed especially for clearness and good taste. Makes a personal stationery you will be delighted to use. An ideal gift with your friend's name. Attractive 3 letter monogram if preferred.

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Through the smooth waters of Southern Seas to Rio de Janeiro, Santos, Montevideo, and Buenos Aires. Fascinating new lands below the equator.

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Southern Cross Western World
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(21,000 tons)

*Fastest Time* *Fortnightly Sailings*

Write for illustrated booklet and tour suggestions.

*Authorized Tourist Agents or*

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*She doesn't fear the dentist*

Wise men and women go to the dentist at least twice a year for a thorough mouth inspection. They don't put off the dental appointment until forced to seek relief from pain and the dentist has to hurt. If you see your dentist in time he can keep your teeth and gums healthy and may prevent serious illness.

# Neglect Punishes 4 out of 5

Failure to take a few simple precautions lets pyorrhea, dread disease of the gums, become entrenched in the mouths of four out of five at forty, and many younger, according to dental statistics.

Start today to brush teeth and gums night and morning with Forhan's if you would be with the lucky who escape pyorrhea's ravages. Forhan's firms the gums and keeps them pink and healthy. It doesn't give this insidious infection chance to steal upon you.

If you have tender bleeding gums go to your dentist immediately for treatment and use Forhan's regularly. The chances are your own dentist will recommend it. It contains Forhan's Pyorrhea Liquid dentists use to combat pyorrhea.

Besides safeguarding your health, Forhan's is a pleasant tasting dentifrice that gives the teeth perfect cleansing; and forestalls decay.

Include Forhan's in your daily hygiene for your health's sake. Pyorrhea is no respecter of persons. Four out of five is its grim count. At all druggists', 35c and 60c in tubes.

*Formula of R. J. Forhan, D.D.S.*
Forhan Company, New York

**Forhan's**
**FOR THE GUMS**

MORE THAN A TOOTH PASTE . . . . *IT HELPS TO CHECK PYORRHEA*

Forhan's
TRADE MARK
FOR THE GUMS
BRUSH YOUR TEETH WITH IT
FORMULA OF
R.J. Forhan D.D.S.
NEW YORK
Specialist in DISEASES OF THE MOUTH
PREPARED FOR THE PRESCRIPTION OF THE
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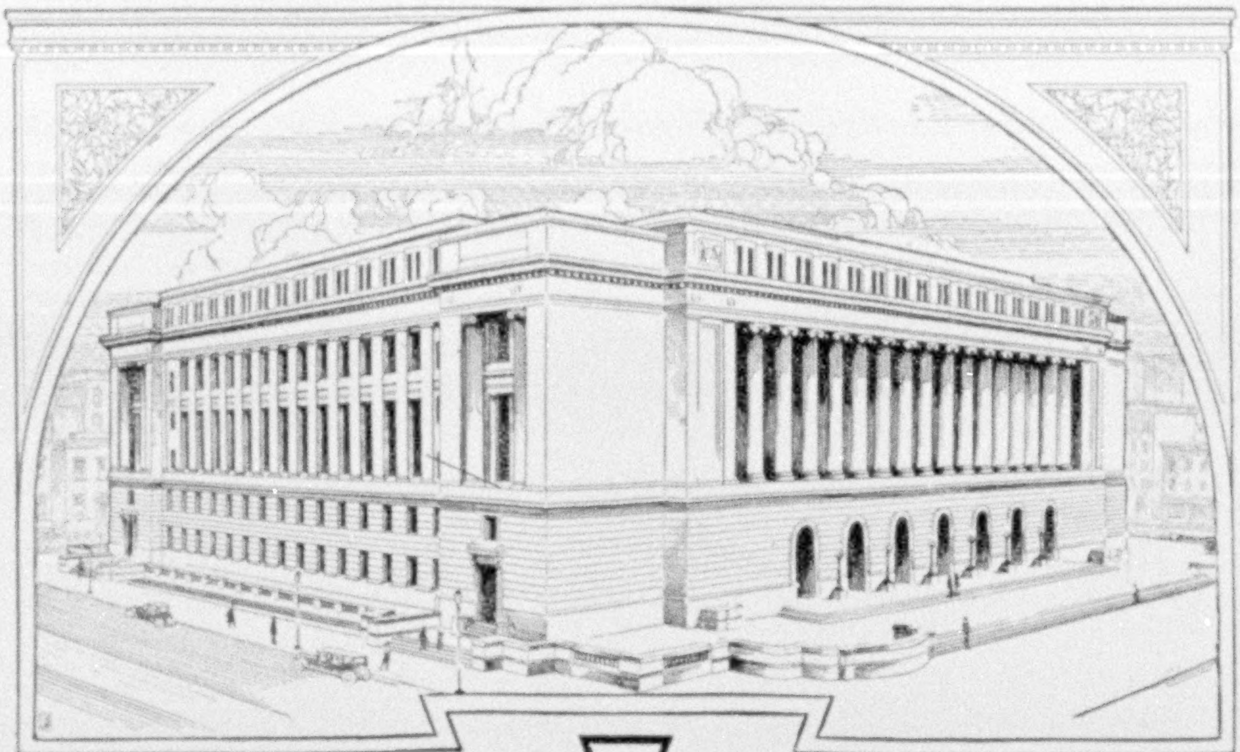
KEYSTONE COPPER STEEL



The Hamilton County Court House, Cincinnati, Ohio.
Keystone Copper Steel used in the Heating
and Ventilating Systems.
Keystone Quality lasts longest.

Standard Engineering Company, Washington, D. C.
Heating and Ventilating Contractors.
Stewart A. Jellett Company, Philadelphia,
Consulting Engineers.

KEYSTONE
COPPER STEEL

STEEL PLUS COPPER means *service* plus *satisfaction* from exposed sheet metal work. The copper steel alloy puts into Steel Sheets and Tin Plates a new measure of endurance and resistance to rust that cannot be obtained without its help. It makes a new metal of steel. By using genuine

# KEYSTONE
## *Rust-resisting Copper Steel*

you will experience the economy of quality. It lasts longer—and the cost is right. Time and weather have proved it. Architects, contractors, builders and property owners—in fact, every one interested in securing better and more enduring construction from Black and Galvanized Sheets and Roofing Tin Plates—should insist that these products be of Keystone quality.

For roofing, siding, gutters, spouting, culverts, tanks, flumes, and all uses to which sheet metal is adapted, Keystone Copper Steel is unexcelled. Sold by leading metal merchants. Read reports of weather tests of American Society for Testing Materials—or send for our booklet *Facts*, giving results of interesting time and service tests which prove conclusively the superiority of Keystone Copper Steel under actual service conditions. This booklet contains the evidence of excellence.

### *Sheet Mill Products*

Black Sheets for all purposes, Apollo and Apollo-Keystone Copper Steel Galvanized Sheets, Culvert and Tank Stock, Formed Roofing and Siding Products, Special Sheets for Stamping, Automobile Sheets, Electrical Sheets, Stove and Range Sheets, Barrel and Keg Stock, etc.

KEYSTONE
COPPER STEEL

### *Tin Mill Products*

American Coke and American Charcoal Bright Tin Plates, Taggers Tin, American Old Style and American Numethod Roofing Terne Plates, MF Roofing Tin Plates, Black Plate for all purposes: Enameling Stock, Stove Pipe and Elbow Stock, Special Stamping Stock, etc.

*Manufactured by* AMERICAN SHEET AND TIN PLATE COMPANY, *Pittsburgh, Pa.*

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Chicago Cincinnati Denver Detroit New Orleans New York Philadelphia Pittsburgh St. Louis
Export Representatives: UNITED STATES STEEL PRODUCTS CO., New York City
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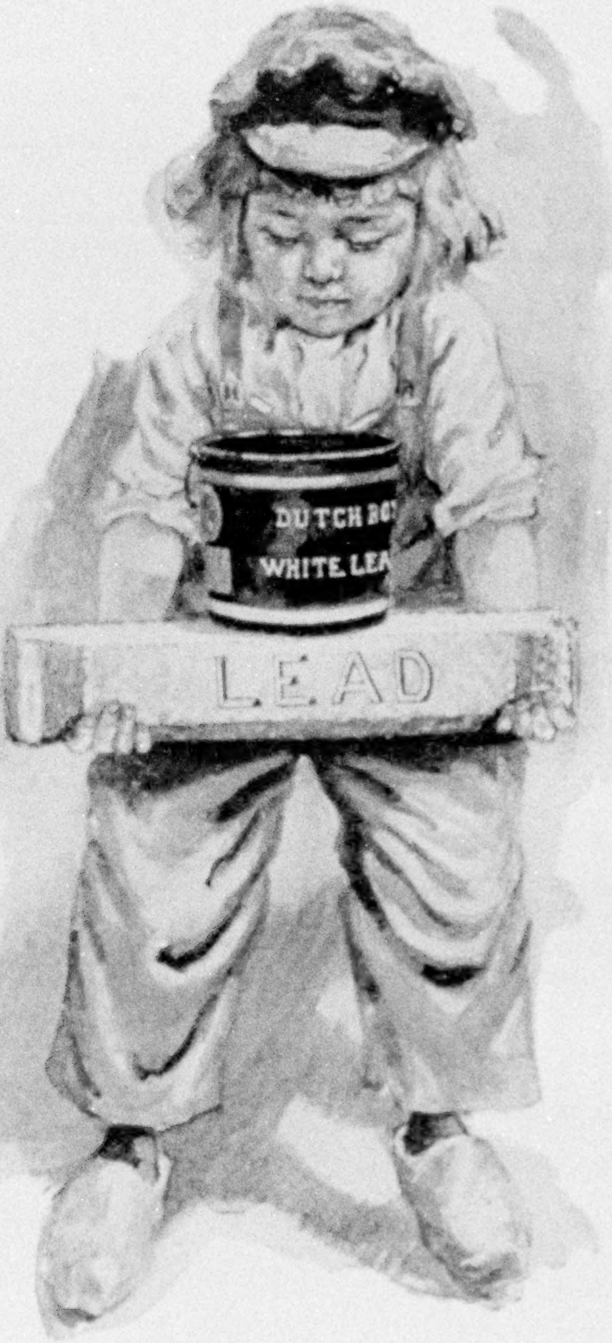
# What paint will you use this spring?

MANY house-owners today will answer that question by saying, "Paint made of Dutch Boy white-lead and pure linseed oil." Why do they prefer this paint?

Dutch Boy white-lead is pure white-lead, corroded from the metal, lead. It makes an all-lead paint which resists the attacks of the weather. It gives sure protection.

If your house needs paint; if it is beginning to look a bit weather-worn and shabby—cover it now with Dutch Boy white-lead paint. Thus you insure yourself against loss from decay. You increase the value of your property. A well-painted house brings a higher price than one that is paint-starved.

Dutch Boy white-lead paint is very reasonable in price. Only 100 pounds of Dutch Boy white-lead is required to make seven gallons of pure lead paint. The real economy, however, in using this paint begins after you buy it. Dutch Boy white-lead paint is durable under all kinds of weather. It does not crack or scale. It enables you to save the cost of repairs you would have to make sooner or later on unpainted and deteriorating property. It lengthens the period between repaintings. And each succeeding year the appearance and the condition of the house painted with white-lead make evident the superiority of a pure lead paint.



### *Write for new paint booklet*

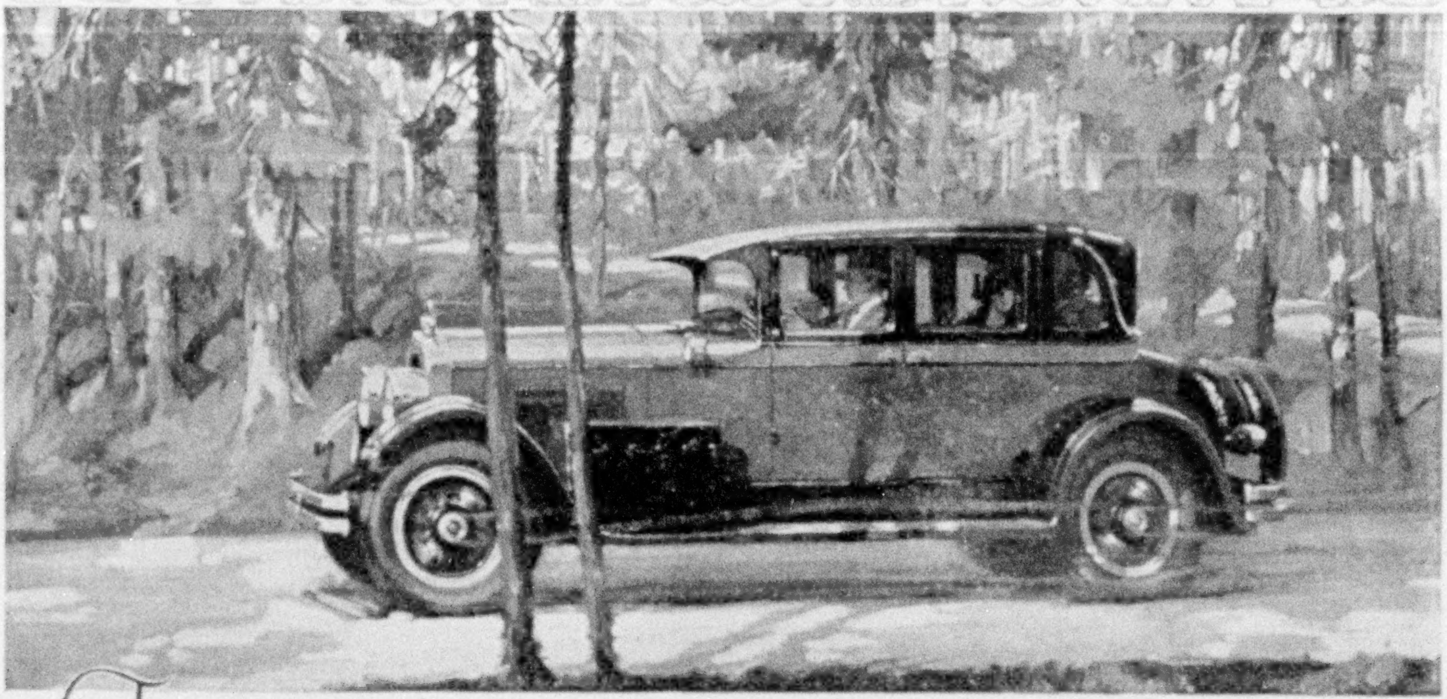
"Decorating the Home" is a new free booklet illustrated in color which suggests decorative treatments for exteriors and interiors. It will be sent you if you write our nearest branch. If you are planning to decorate your home, write our Department of Decoration in care of our nearest branch. Specialists will help you plan distinctive color treatments without charge.

NATIONAL LEAD COMPANY
New York, 111 Broadway; Boston, 131 State Street; Buffalo, 116 Oak Street; Chicago, 900 West 18th Street; Cincinnati, 659 Freeman Avenue; Cleveland, 820 West Superior Avenue; St. Louis, 722 Chestnut Street; San Francisco, 485 California Street; Pittsburgh, National Lead and Oil Co. of Penna., 316 Fourth Avenue; Philadelphia, John T. Lewis & Bros. Co., 437 Chestnut Street.

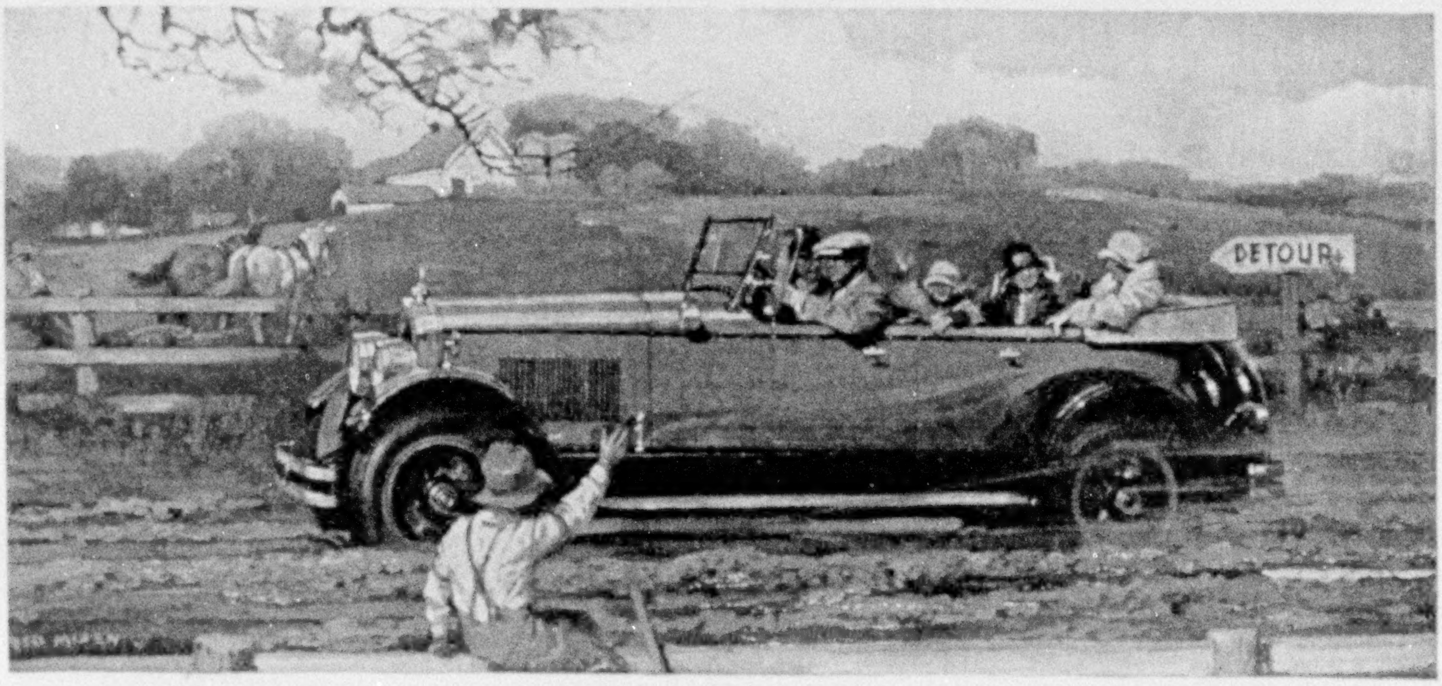
*You will see the figure of the Dutch Boy Painter on every keg of Dutch Boy white-lead. It guarantees a product of the highest quality. In addition to white-lead, there are also made under this trademark: red-lead, solder, babbitt metals, and flatting oil for use with white-lead in painting interiors.*

# Dutch Boy White-Lead

## Makes an All-Lead Paint



# TOURING OR DETOURING — *it's all the same to a Marmon* —

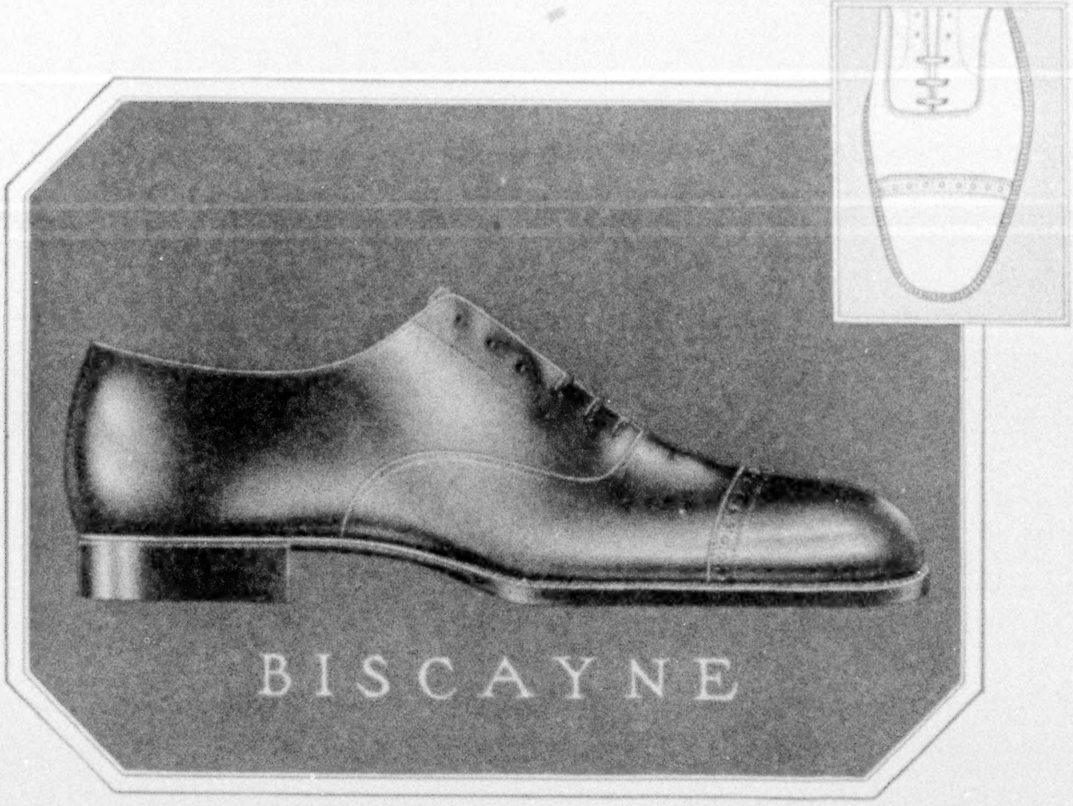


The Marmon owner spreads the road map across his knee with the knowledge that he can go where he wants to go, when he wants to go, and can arrive at his destination safely, on time and without fatigue—all due to exclusive engineering features which year after year uphold Marmon's reputation as the world's greatest road car. Arrange with the nearest Marmon dealer for a week-end demonstration and discover for yourself why

*It's a Great Automobile*

MARMON MOTOR CAR COMPANY
Indianapolis, Indiana

## *The* NEW MARMON



BISCAYNE

## *Something few people know!*

How many cylinders has a certain world-famous car? What kind of bearings or steel in the axle? Few people know. They take technical details for granted in a product that dominates. ~ What kind of leather goes into Banister Shoes? Nobody asks. They are sure we choose the finest leather for the purpose. There are no questions regarding the hidden parts or workmanship of Banister Shoes. ~ For the appearance, the style, the aristocratic lines, and above all the character of Banister Shoes lift them above question. That is one of the rewards of eighty-one years' endeavor to make the finest shoes. ~ Men who value appearance, who demand the best that life offers in all things, instinctively choose Banister footwear.

*Name of nearest dealer and*
*style booklet upon request.*

JAMES A. BANISTER COMPANY
Newark, New Jersey

LEAGUE

# BANISTER SHOES

*Since 1845 the Choice of Gentlemen*

PRESS OF JUDD & DETWEILER, INC.
WASHINGTON, D. C.

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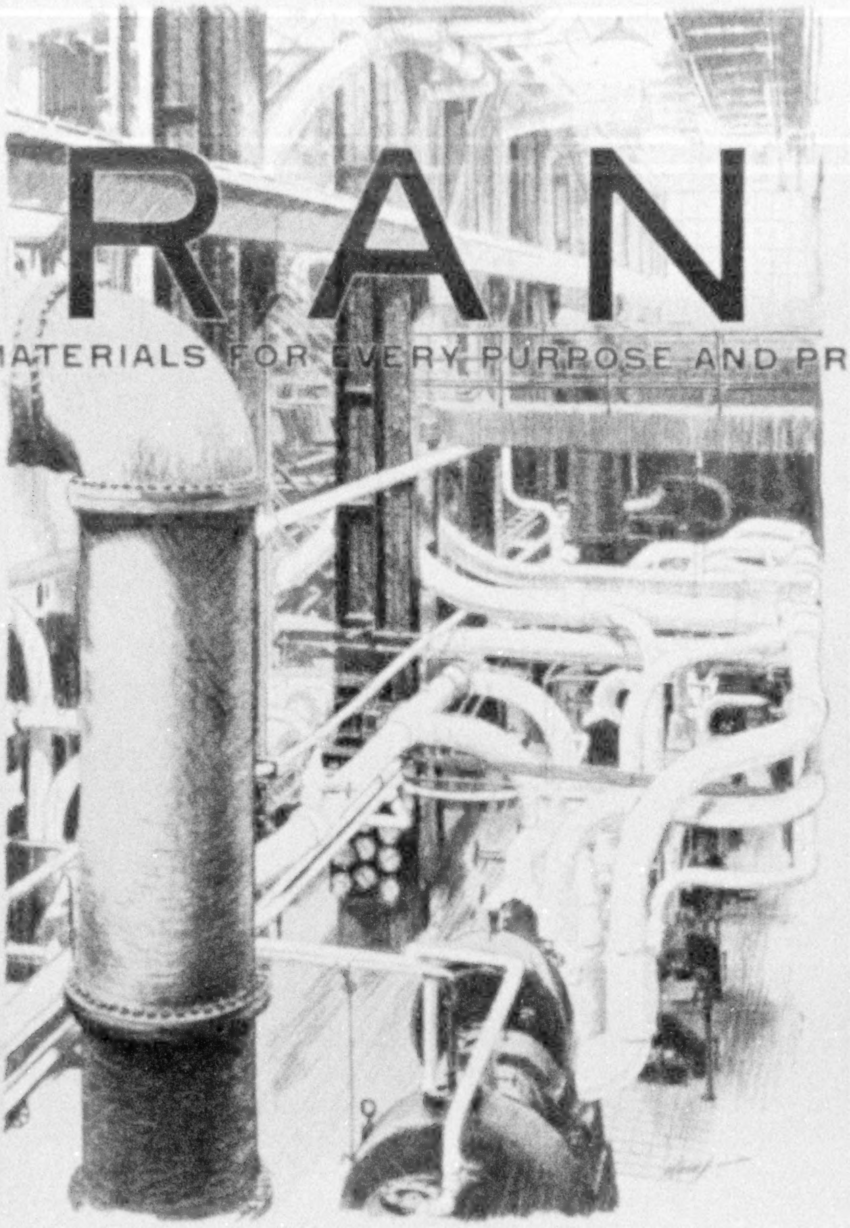
# CRANE

PIPING MATERIALS FOR EVERY PURPOSE AND PRESSURE



A view of the efficiently equipped pump room in the new High Bridge Station of The Northern States Power Co., at St. Paul, Minn. Operated by the Byllesby Engineering and Management Corporation. Crane valves, fittings, and piping materials used exclusively

No valve is too small to be without Crane quality

## Where one pound of coal now does the work of three

THE power engineers of the electrical industry may well be proud of their achievement. As costs have risen, they have forced steam pressures and temperatures up, to keep the cost of current down. Now they produce as much electricity from one pound of coal as was formerly made from three.

This great fuel economy resulting from high pressure and superheat depends on safe piping materials. The ability of Crane Co. to supply valves and fittings for these new demands is based on pioneer research, which determined the behavior of metals under stress. It is grounded on foundry experience that began in 1855. It is assured by chemical control of raw materials, by correct design and engineering, by unbiased testing.

With such knowledge and care, Crane builds valves for all purposes and pressures, in every wanted size; valves that accurately fit all modern needs: a faucet for the kitchen sink, a control for the radiator, a pop for the locomotive, an exhaust relief for the power plant, a giant control for the city water main. These and over 4300 other types and sizes are the valves that Crane makes to serve every requirement of industry and the home, to give you safety, dependability, and economy.

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